CONTINUITIES IN FOUR DISPARATE AIR BATTLES

BY

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About The Author

Lt Col Michael F. Fleck was commissioned through the United States Air Force Academy, Colorado Springs, Colorado in 1988. Following Undergraduate Pilot Training in 1989, he stayed at Williams AFB, Arizona as a T-38 Instructor Pilot. He was subsequently assigned to fly the C-5 Galaxy at Travis AFB, California, and later selected to fly the U-2 at Beale AFB, California. Lt Col Fleck is a senior pilot with over 4200 flying hours. He has a bachelor's degree in Astronautical engineering from the Air Force Academy, a master's degree in Aeronautical Science from Embry Riddle Aeronautical University, and a master's degree in Operational Art and Science from Air University. In June 2003, Lt Col Fleck was assigned to the Eighth Air Force.

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Abstract

Since Thucydides chronicled land and naval warfare in 420 B.C., volumes have been written on innumerable battles in search of continuities, principles, and the nature of surface warfare. Air warfare has a comparatively short history. Yet, after 100 years of heavier-than-air flight, and numerous air battles and campaigns, airpower may finally be revealing some of its continuities and immutable principles. If so, what is the best way to find and study the continuities for application by the practitioner?

This study examines four dissimilar air battles or campaigns as case studies from WWII to Vietnam (1943-1973) in search of continuities in airpower. They are presented in an operational planning format in the hopes that the cases will more directly transfer to the practitioner. The case studies are limited to U.S., land based, fixed wing, post WWI battles and campaigns. Additionally, relatively well-known cases were selected to aid research, and subsequent additional study by the reader. The narrow focus is intentional to aid brevity. Although the air arms of the Army, Navy, and Marine Corps are not included, their contribution to airpower should not be underestimated.

The first case study is the raid on the oil refineries at Ploesti, Romania on 1 August 1943. This case reveals the risks versus expected gains of counter-doctrine employment of heavy bombers, the bomber's flexibility, and the limits of flexibility in tactics and operational art. The second case study is the Berlin Airlift. In this case, non-lethal strategic airpower was used to achieve political goals. The success of the lift was in part

due to the interaction and constant improvements in three major systems common to all air operations. The third case study was MiG Alley in the Korean War. F-86 Sabres battled MiG-15s over MiG Alley for air superiority over the Korean Peninsula. MiG Alley reveals the importance of technology, tactics, and training in air warfare, as well as the limits of air superiority in the larger context of the war. The fourth and final case study is BARREL ROLL in Laos. Here, a small, clandestine air force aided local guerillas in challenging a larger North Vietnamese army by using airlift, liaison, limited strikes, and the occasional call on the "Big Blue" Air Force.

There were at least four continuities revealed in the case studies. They were flexibility, airpower's close tie with politics, airpower's ability to overcome barriers or sanctuaries, and airpower's "strategic blind spot" regarding ground defenses.

Chapter 1

History For Operators

Warfare is the greatest affair of state, the basis of life and death, the Way to survival or extinction. It must be thoroughly pondered and analyzed.

Sun-tzu The Art of War 400-320 B.C.

Introduction

For thousands of years man has realized the importance and purpose of studying military history. Quite simply, it is to learn the lessons of the past so that they can be applied in the future. If indeed the currency of war is life and death for the individual and state, as Sun-tzu suggests, then motivation for careful study is self-evident. However, war is frequently convulsive and episodic. War is neither convenient nor accommodating in revealing its lessons—they must be extracted by mining, thinking, and analysis. However, Carl von Clausewitz cautions, "The deduction of effect from cause is often blocked by some insuperable extrinsic obstacle: the true causes may be quite unknown. Nowhere in life is this so common as in war, where the facts are seldom fully known and the underlying motives even less so."[1] Nothing inherent in modernity, for all its technology, suggests that this characteristic can be eliminated. Further, even when pieces of truth are extracted prompting changes in military doctrine, tactics or equipment,

[1] Carl von Clausewitz, *On War,* ed. And trans. Michael Howard and Peter Paret (Princeton N.J.:Princeton University Press, 1976), 156.

military rehearsal is all but impossible to the degree of fidelity that war's ultimate stakes demand. So what is the serious practitioner to do? If one can neither be certain of cause and effect, nor prepare adequately for such an event as war, why study history at all?

Richard Neustadt and Ernest May offer advice on the place of history in the future. They state that since the future must come from the past, and if we can perceive subtle changes in established patterns, then we can increase our predictive success of the future.[2] Further, they believe that marginal improvements are still worth seeking. And in the case of war, where numerous practitioners make countless decisions, marginal improvements may make all the difference in the world. And a difference is what counts in war. In warfare perfection is desired, however simple advantage is required. Examining history is but one way to seek advantage.

However, airpower has a relatively short history compared to surface forces. In 420 B.C., Thucydides chronicled land and naval combined arms warfare during the Peloponnesian War. Since then, volumes have been written on surface warfare illustrating and illuminating immutable principles. Airpower would have to wait two millennia before its first history would be written following its first large-scale debut in the skies of Europe. So, now after 100 years of heavier-than-air flight, is the cumulative history of airpower finally beginning to reveal some of its immutable principles and changes from combat experience? If so, what is the most effective way of studying combat to illustrate those principles and changes? Or, are there other factors that are more important to the development of airpower than combat experience?

[2] Richard E. Neustadt and Ernest R. May, *Thinking in Time, The Uses of History for Decision Makers,* (New York: The Free Press, 1986), 251.

This paper examines four dissimilar air battles or campaigns as case studies from WWII to Vietnam (1943-1973) in search of continuities in airpower. The case studies are limited to U.S., land based, fixed wing, post WWI campaigns. Additionally, only relatively well-known campaigns were selected to aid research and maintain a strong connection with general knowledge and encourage independent study. The narrow focus of the battles is intentional to aid brevity. The combat experience of Army, Naval, and Marine aviation is not included. Their contributions should not be underestimated however. Little doubt exists of the power of force projection from Naval and Marine air, or the mobility and firepower of Army aviation. Further, this study is not intended to establish causal linkages, but only to illuminate and illustrate where continuities exist. Major General Orvil Anderson once cautioned, "If you only let experience be your teacher, you can have any damn lesson you want."[3] Lastly, a format for case study is introduced and evaluated.

Initial Conditions

Observation was the first and primary mission of military aviation. During the American Civil War, balloons were used to raise soldiers over the battlefield in order to observe enemy troop dispositions and movement. The advantages of the high ground were not lost on Orville and Wilbur Wright when they demonstrated heavier-than-air flight. Negotiations with the Army ensued and in 1908 the first Wright Flyer was delivered to the Signal Corps. Prior to WWI, aircraft had effectively demonstrated

[3] Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960*, vol. 1, (Maxwell AFB, Al.: Air University Press, 1989), 147.

observation and liaison, fired a machine gun, and dropped a bomb.[4] However, Captain William Mitchell said in 1913, "[t]he offensive value of this thing has yet to be proved. It is being experimented with—bomb dropping and machines carrying guns…but there is nothing to it so far except in an experimental way."[5]

War in Europe spurred airpower technology and thought as the interlocutors sought to return movement to the battlefield. Bombardment showed early promise as a direct path to enemy morale and army supplies behind the battlefield. Attack aviation was employed directly on enemy troops along the line of advance. Similarly, pursuit aviation evolved primarily to deny enemy observation.

America's WWI experience was short, yet its contributions decisive. In that brief time, span, the Air Service had worked out most of its major roles and mission that are still in existence today.[6] Airpower's visionaries led by William "Billy" Mitchell would leave WWI on a mission to push the boundaries of airpower armed with only promise and mixed results from the battlefield. They ran into demobilization, shrinking budgets, isolationist politics, the depression, and many tough, fair questions from budget rivals in the Navy and other branches of the Army.

Though the obstacles were high, the interwar years were a time of great growth for the Air Corps. The battle for an independent Air Force and technological advancements not withstanding, the most significant development in the Air Corps was its doctrinal pursuit of a theory of how to fight an air war. The Air Corps Tactical School with its

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[4] David R. Mets, "Army Roots," in *The Air Force,* (Hugh Lauter Levin Associates, Inc.,), 11. Also Richard J. Overy, "Strategic Bombardment before 1939, Doctrine, Planning, and Operations," in *Case Studies in Strategic Bombardment,* R. Cargill Hall, ed., (Washington D.C.: Government Printing Office, 1998), 13.
[5] Quoted in Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960,* Vol. 1, (Maxwell AFB, Ala.: Air University Press, 1989), 17.
[6] Mets, "Army Roots," 14.

roots established in 1922, did the heavy lifting in this area. By the eve of American involvement in WWII, the airpower doctrine of high altitude daylight precision strategic bombardment of industrial web targets had emerged.[7] But this strategy suffered from the same problems that had plagued interwar airpower theory. James H. Doolittle lamented, "the trouble was that we had to talk about air power in terms of promise and prophecy instead of in terms of demonstration and experience."[8] Combat experience is what the maturing ideas of airpower needed to validate or change fighting doctrine.

Case Studies

The first case study examined is the raid on the oil refineries of Ploesti, Rumania on 1 August 1943. In the midst of a high altitude precision bombardment doctrine and strategy that symbolized the Combined Bomber Offensive, 177 heavy B-24s Liberators performed a daring low-level raid on the *Wehrmacht's* prize source of oil. There were heavy losses. It was to be the only USAAF large formation heavy bomber low-level raid of the war in Europe.

The second case study is the use of non-lethal airpower during the Berlin airlift of 1948. East-West relations were souring even before the end of WWII, and Berlin became the first test of strength between the two superpowers as the Soviet Union blockaded all traffic from the western sectors of Berlin. With the new nuclear bomber force sidelined, a massive airlift accomplished the improbable and helped buy time for a political solution.

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[7] Stephen L. McFarland and Wesley P. Newton, "The American Strategic Air Offensive Against Germany in World War II," *Case Studies in Strategic Bombardment*, ed. R. Cargill Hall (Washinton D.C.: Government Printing Office, 1998), 183. Industrial web targeting asserts that there are relationships between key military industries that, if destroyed, would have a disproportionate effect on numerous other industries.

[8] Futrell, 75.

The next case study is the air superiority campaign in MiG Alley during the Korean War. From 1950 to 1953 the U.S. sparred with an elusive enemy flying from their sanctuary in Manchuria. With political limitations on its air superiority doctrine, how did the U.S. proceed to amass a 10-1 victory ratio in air-to-air combat? Having won air superiority, what effects did airpower have on the land campaign?

Lastly, the fourth case study is Operation BARREL ROLL. BARREL ROLL was the covert air support for the counter-insurgency campaign in Laos. For five years, a hand-full of airmen using obsolete equipment kept a small, vigorous band of guerrillas in the field against a much larger Pathet Lao and North Vietnamese army at a mere fraction of the cost of the war in Vietnam. Did the Air Force adapt force structure and doctrine to take advantage of the relative success of Laos?

The conclusion uses inductive reasoning, summarizing the lessons of the four case studies, and illustrating contemporary examples with evidence from the 1991 Gulf War. Causal relationships are not drawn, only suggestions to the nature of current and future uses of airpower. There is a danger in concluding too broadly. Such general conclusions give little insight to the nature and future of airpower. Similarly, concluding too narrowly based on single case studies runs the risk of being relevant only to very specific circumstances unlikely to be repeated. The goal is middle ground. Can conclusions be drawn about the use of the air weapon that address case specifics, yet can be extrapolated to future use under a variety of circumstances?

Format

The format selected to organize the case studies is taken from Joint Doctrine. JP 5-00.1, *Joint Doctrine for Campaign Planning* describes the format for a theater campaign

plan. The five major paragraph format includes situation, mission, execution, administration and logistics, and command and control.[9] Each campaign will be analyzed based on this framework. For example, the politico-military environment influencing the campaign or battle is described in the situation paragraph. There is one exception. The execution paragraph is addressed last in the sequence. This aids the flow of analysis and reflects the difference between future plans and past events.

Conclusions drawn about airpower in the campaigns are based on some assumptions. First, airpower will continue to be an instrument of national and military power used for national interests. That is not to say that airpower cannot be used in a collective security environment. Second, airpower will remain a politically acceptable, and at times preferred, instrument of military power. Third, the rate of technological improvements in weapons systems remains positive, stable, and past its most radical changes. Lastly, no weapon will make airpower irrelevant. This is not to say that relative technological advantage may not have overwhelming decisive effects.

[9] Joint Doctrine Publication (JP) 5-00.1, *Joint Doctrine for Campaign Planning,* 25 January 2002, C2-C8.

Chapter 2

Ploesti: Heavy Bombers Go Low

Over the cooling tower the pilots got [Jersey Bounce] leveled out and walked her on tree tops and telegraph poles…where she went into a long slide…Only then did her bomb bay tanks burst and flames spring from the gas sluicing through the interior. Lockhart squirmed out…and ran with his head and hands aflame.

James Dugan and Carroll Stewart

Situation

On 1 August 1943, 178 B-24D Liberator bombers took off from Benghazi, Libya and flew the longest combat mission to date. The target was the Romanian oil refineries at Ploesti, the "taproot of German might."[10] What made this mission unique was not the target, or the distance flown, but the tactics used by heavy bombers—mass formation, minimum altitude.

Ploesti, Romania was a lucrative target, but far from accessible. Located 35 miles north of Bucharest, the city was home to 9 large oil refineries. These refineries supplied the Axis powers with fully one-third of their total liquid fuels including diesel, oil lubricants, gasoline and high-octane aviation gasoline.[11] Further, the Romanian

[10] James Dugan and Carroll Stewart, *Ploesti, The Great Ground-Air Battle of 1 August 1943*, rev. (Washington DC: Brassey's, Inc., 2002), 3.
[11] *The Ploesti Mission: 1 August 1943 (Short Title: AAFRH-3)*, Army Air Forces Historical Study 103 (Maxwell AFB, Al.: Assistant Chief of Air Staff Intelligence Historical Division, June 1944), 3-4.

production was even more important to the German supply system in the East where the *Wehrmacht* and *Luftwaffe* were delivering staggering blows to the Red Army. If the refineries at Ploesti could be destroyed, there may be immediate relief in the East, and the German transportation system would have to carry oil farther to the Eastern Front. However, Ploesti remained well protected and out of range of Allied bombers.

The Soviets also recognized Ploesti's importance and mounted numerous ineffectual attacks. Similarly, after the U.S. declared war on the axis powers, it sent a group of 23 B-24 bombers to the Far East via Africa. Called the Halverson Project (HALPRO), they were to mount an attack on Japan similar to the Doolittle raid. However, rapidly changing events in the Far East collapsed the project's logistics plan and a new target scheme was hatched. General George C. Marshall, Army chief of staff, won approval for the aircraft of HALPRO to divert to Egypt and bomb Ploesti just as the Nazis were driving toward the Baku oil fields in the U.S.S.R. On 11 June 1942, a mere 13 B-24s took off, flew all night, and on the morning of 12 June, bombed Ploesti.[12] Although defenses were light, bombing from medium altitude with only 13 bombers in poor weather resulted in only minor damage. However, the Soviet and American actions did serve notice to the German defenses.

Soon the level of German defenses reflected its value as a target. *Generalmajor* Alfred Gerstenberg, "The Protector," was assigned to defend Ploesti. He did so with 75,000 troops and 250 fighter aircraft.[13] Gerstenberg employed both active and passive methods. Multiple rings of flak batteries surrounded the city featuring 88mm and 37mm guns, light machine guns, and heavy flak trains. Anti-aircraft artillery (AAA) was also

[12] Wesley F. Craven and James L. Cate, ed., *The Army Air Forces in World War II*, vol. 2, (Chicago: University of Chicago Press, 1949), 10-11.
[13] Michael Hill, *Black Sunday: Ploesti*, (Atglen, Pa.: Schiffer Military/Aviation History, 1993), 13.

positioned in towers at the refineries and in haystacks. Barrage balloons with line charges were tethered over the refineries. They would detonate as the wing of an aircraft slid up the cable tether to the contact charge. Passive measures included entire decoy refineries south and east of Ploesti, high blast walls to prevent the spread of fire, and a 500-man fire fighting force. Though the known and actual defenses were formidable, the allies still considered Ploesti a viable target.

The Casablanca Directive issued on 21 January 1943 committed the allies to a Mediterranean campaign in lieu of an early cross-channel assault on continental Europe. The major operational maneuver following Operation TORCH in North Africa was to invade Sicily (Operation HUSKY) and roll up the Germans and Italians on the Italian peninsula. HUSKY became the main effort and the Ninth Air Force flew operations from North Africa accordingly. Although Ploesti was a lucrative target that might affect the overall war effort, war planners did not think they could devote enough sorties to destroy Ploesti and still support HUSKY. Estimates ran as high as 2,400 high altitude sorties over two months for only partial destruction.[14] Further, each mission might encounter increasingly severe enemy defenses and the advantages of high altitude bombing thus diminished. Consequently, air planners sought to destroy Ploesti in minimum time, with minimum sorties, while still supporting Operation HUSKY.

Although Ploesti did not fit into the scheme of maneuver for Operation Husky, it did fit into the priorities of the air war plan. The Air War Planning Division (AWPD) at the Air Corps Tactical School introduced their industrial web targeting theory and target priorities with AWPD-1 prior to the war. They refined priorities again with AWPD-42, and further at the Casablanca conference. While still supporting the ground commanders,

[14] AAFRH-3, 22.

the Army Air Corps heavy bombers focused on these "independent" strategic missions. Although at the time of the Ploesti raids, the German submarine and aircraft production facilities held a higher targeting priority, Ploesti was particularly attractive as a target.[15] It represented a large portion of the total German petroleum production. Ploesti was also located close to the Russian front, thereby reducing the burden on German transportation. Recognizing the importance of the target, several plans to destroy Ploesti were created, but one emerged the favorite.[16]

The primary planner of the Ploesti mission, code named SOAPSUDS was Colonel Jacob E. Smart. Smart was an advisor on Gen Henry H. Arnold's advisory council and favored a low altitude attack. Although recognized as hazardous, "…it was felt that the decisive results expected, because of the greater accuracy of low-level bombing of pin-point targets, would justify these losses, and that a single such attack might in the long run be even more economical than numerous attacks at high altitude."[17] Following General Eisenhower's approval on 3 June 1943, Col Smart proceeded to the Middle East for the initial planning session with the commanders who were going to execute the mission. General Uzal G. Ent, commander of the 9th Bomber Command commissioned a study for the essential question of whether to attack from high or low altitude. Gen Ent's study concluded that four high altitude attacks over nine days would have a better than even chance of destroying 50 percent of the targets. Losses were estimated at 22 aircraft over the four missions. No extra training was planned for the high altitude flights, whereas training for the low-level attack was estimated at two weeks. Further, Ent's

[15] Craven and Cate, vol. 2., 305.
[16] AAFRH-3, 20-22.
[17] Quoted in AAFRH-3, 22.

study estimated the number of losses in a low level raid to be 75 aircraft and he therefore considered crew morale as a critical factor in the decision. In the end, Gen Ent was not in favor executing SOAPSUDS from low altitude.[18]

Smart took Ent's recommendation to Maj Gen Lewis H. Brereton, Ninth Air Force commander, and recalculated the numbers using a 90 percent target destruction criteria. The new results yielded 20 high altitude missions over two to three months at a loss of 170 aircraft. Using the same target destruction criteria, a single low-level attack would cost 15 days of training and 71 aircraft destroyed—with the caveat of possible greater losses.[19] Smart's analysis contained a detailed side-by-side comparison of high and low altitude attack. (See Table 1.) The low altitude tactics favored surprise, bombing accuracy, fewer sorties, time, defense against fighters, and psychological dislocation of the enemy. The disadvantages of low-level attack were training difficulty and time, tactical maneuverability, crew morale, accuracy of AAA and other defenses, mid-air collision over the target, and the requirement for surprise.[20]

It was evident that time, risk, and level of destruction were the three primary variables in the decision making process for Gen Brereton. The level of destruction in both options was constant at 90 percent. The risk was calculated as less for the low altitude mission, but with the possibility of disaster. However, a planning summary concluded, "if it is granted that the successful destruction of the target would warrant the possible expenditure of the entire force, then the time element and its effect on the war would appear to be a deciding factor in favor of the low altitude attack."[21] Gen Brereton

[18] AAFRH-3, 36.
[19] Ibid., 36-37.
[20] Ibid., 152, and adapted for Table 1.
[21] Quoted in AAFRH-3, 37.

announced his decision on 6 July 1943 to go with the low-level attack citing the desire to inflict maximum damage in a single attack, and the probability of surprise.[22] The mission was re-named TIDALWAVE and three weeks of intense training ensured.

The 10-man B-24D was the only bomber capable of the required 2,400 mile round trip to Ploesti. To make the trip, it was fitted with additional 300-gallon range extension tanks mounted in the bomb bay. Excess weight was removed to and replaced by extra armor, and additional forward firing guns bringing its total armament to ten 50-caliber machine guns. The Norden high-altitude bombsight was removed in favor of one from an A-20, more suitable for low-altitude tactics.[23] The bomb loads used were a combination of 500 lb and 1,000 lb bombs with delay fuses to allow formations to pass without exposure to blast fragmentary patterns. Incendiary bombs were carried for hand dispensing out of the waist gunner's window! The B-24D cruised at 200 mph, about 18 mph faster than a B-17 Flying Fortress, yet 100 mph slower than front line German fighters.

TIDALWAVE was unique in its rigorous training. Full-scale targets were outlined in the North African desert and mock attacks from low altitude were conducted. Further, the British produced a briefing movie so all crews would have access to the same information. Scale models of the refineries were built and oblique photographs were taken. The photographs familiarized the crews with low-altitude visual references.

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[22] Lewis H. Brereton, *The Brereton Diaries, The war in the Air in the Pacific, Middle East and Europe 3 October 1941-8 May 1945,* (New York: William Morrow and Company, 1946), 192. Brereton also provided for subsequent attacks at either high or low altitude depending on the success of the low-altitude attack.

[23] Hill, 21.

Mission

Field order # 58 stated, "The Ninth U.S. Air Force will attack and destroy the 7 principal oil refineries in the PLOESTI area on 1 August 1943 employing 7 target forces in a minimum altitude attack in order to deny the enemy use of the petroleum products processed in that area."[24] The intent was to reduce the output of the refineries for approximately four months. The forces were to proceed at low-altitude over the Mediterranean and mountains of Yugoslavia in order to evade enemy radar and conserve fuel. Crossing the Danube river, the forces were to descend to minimum altitude, proceed via their initial point, split into multiple waves, and attack their targets.

Administration and Logistics

The only forces in North Africa available for the mission under the Ninth Air Force were the 376th and 98th Bomb Groups (BG)—the mission required more. The 93rd and 44th BGs were temporarily reassigned from the Eighth Air Force in Britain, and the 389th BG was diverted to North Africa when it was en route from the US to England. Over 1,000 personnel were reassigned from surrounding units, as the additional bombers would not come with their ground crews. The Royal Air Force provided extra security.[25] A plan to launch the attack from a distant base at Aleppo, Syria was scrubbed due to logistics limitations. Although that mission would have been shorter, it would violate neutral Turkish territory and there was not enough shipping to transport the units to that base. Further the Benghazi installation was more suited for large bomber operations. Logistics was further confounded by unusually high consumption of aircraft parts. The

[24] AAFRH-3, 156.
[25] Brereton, 189.

harsh desert climate took its toll on engines, reducing service their life from 300 to 60 hours.[26]

Command and control

Overall commander of the operation was Maj Gen Brereton, Ninth Air Force commander. The mission commander was Brig Gen Ent, the 9th Bomber Command commander. His five group leaders were Col Keith K. Compton, 376th Bomb Group (BG), Col Addison E. Baker, 93rd BG, Col John R. Kane, 98th BG, Col Leon W. Johnson, 44th BG, and Col Jack W. Wood, 389th BG. Compton was designated the flight leader in the flight orders and Baker designated deputy.[27] Overall command of the mission was Gen Ent, flying in Compton's aircraft.[28] Compton was also the planned force leader, but at the last minute, he passed those duties to a senior flight commander, Lt Flavelle. Tactical control was primarily via flight discipline in formations of five groups. Their target assignments and ground tracks to the targets were briefed to maximize the chances of finding the target and minimizing the chances of mid-air collision. The force was to maintain strict radio silence.

Execution

At 0400 on 1 August 1943, the first of 178 bombers took off, circled and formed up over the field in the dark pre-dawn sky. An engine failure on one of the overweight bombers soon claimed one aircraft. The now 177-bomber force made its way slowly over the Mediterranean toward Corfu, Greece. Compton's 376th led with Baker's 93rd,

[26] Hill, 25.
[27] AAFRH-3, 156-57.
[28] Ibid., 82, 155-157.

Kane's 98th, Johnson's 44th and Wood's 389th BGs following in order. Nearing Corfu, Compton visually signaled the lead 376th BG to climb to 10,000 feet in order to clear the upcoming mountains. In a still inexplicable crash during the climb, the force leader, Flavelle, spun and crashed his aircraft into the Mediterranean. Further, his wingman back-up force navigator broke formation, circled the crash site, and returned to Africa.[29] Compton and Ent were unaware that the lead aircraft had crashed and that the deputy navigator had turned back.

[29] Dugan and Stewart, 107.

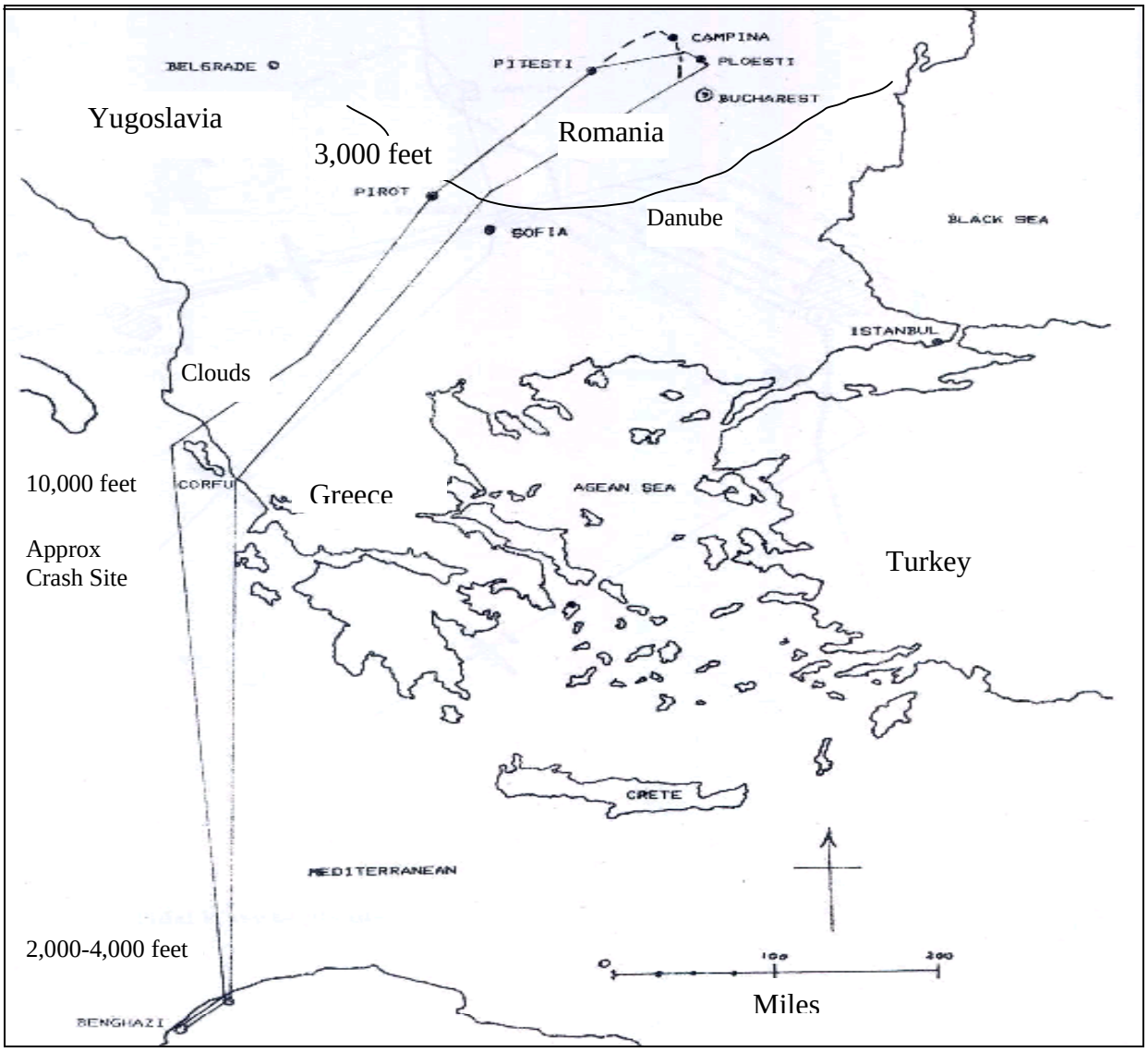

Figure 1 TIDAL WAVE Route of Flight

Source: Adapted from Michael Hill, *Black Sunday,* 1993

Entering Yugoslavia, the five groups encountered heavy clouds. Attempting to remain clear of the clouds, the formations maneuvered and loosened. The third group, the 98th under Colonel Kane, lost contact with the first two groups. The situation deteriorated when the lead two groups went over the clouds and gained a tailwind, and the last three groups remained lower and slower. Finally the formations descended near the Danube River and broke into the clear. The two lead groups realized the trailing three

were nowhere to be found. They maintained strict radio silence even when attempts to regroup visually failed.

Still, the bombers made their first Initial Point (IP) in fairly good order, albeit in two separated forces, with all but 13 aircraft that had turned back for various mechanical malfunctions. At this point, the most serious errors occurred. Now at literally treetop level, flying from the first to second initial point, someone onboard Compton's aircraft of the 376th mistook the town of Targoviste for Floresti, their turn point to Ploesti. Flying as a wingman, Compton and Ent did not observe the lead aircraft turning toward the target area, so Ent broke radio silence and ordered the entire force to turn almost 20 miles short of the correct turn point. Several pilots from other aircraft protested. The trailing 93rd realized the mistake, but also turned in order to maintain formation integrity and for fear of mid-air collisions over the target area. After flying to the outskirts of Bucharest, Compton and Ent realized their mistake and ordered the formation due north to Ploesti for the attack. They subsequently encountered heavy flak and turned east to find a safer attack axis. When the 376th turned east, the trailing 93rd decided to break formation and attack on the north axis. By now the defenses were at full alert. Smoke, flak, balloons, and fighters were thick and taking their toll.

At approximately 1200, the 93rd attacked from altitudes of 100 to 300 feet releasing bombs and incendiaries that were seen to make good hits. Unfortunately, it is still uncertain which targets were struck. It is likely that the 93rd at least partially struck targets designated for the 44th and 98th which would later lead to more confusion. The 93rd lost a stunning 12 of 32 bombers to the defenses.

The 376th with Compton and Ent made another attempt at Ploesti from the east and again encountered heavy defenses. Ent ordered the group to attack targets of opportunity and individual crews dumped bombs on "targets" ranging from trees to storage tanks. Most of the formation chose to fly north to Campina, the target for the 389th. One flight

of the 376th led by Major Appold did cross Ploesti at 1205 from 120 to 150 feet and probably attacked the targets assigned to the 93rd.

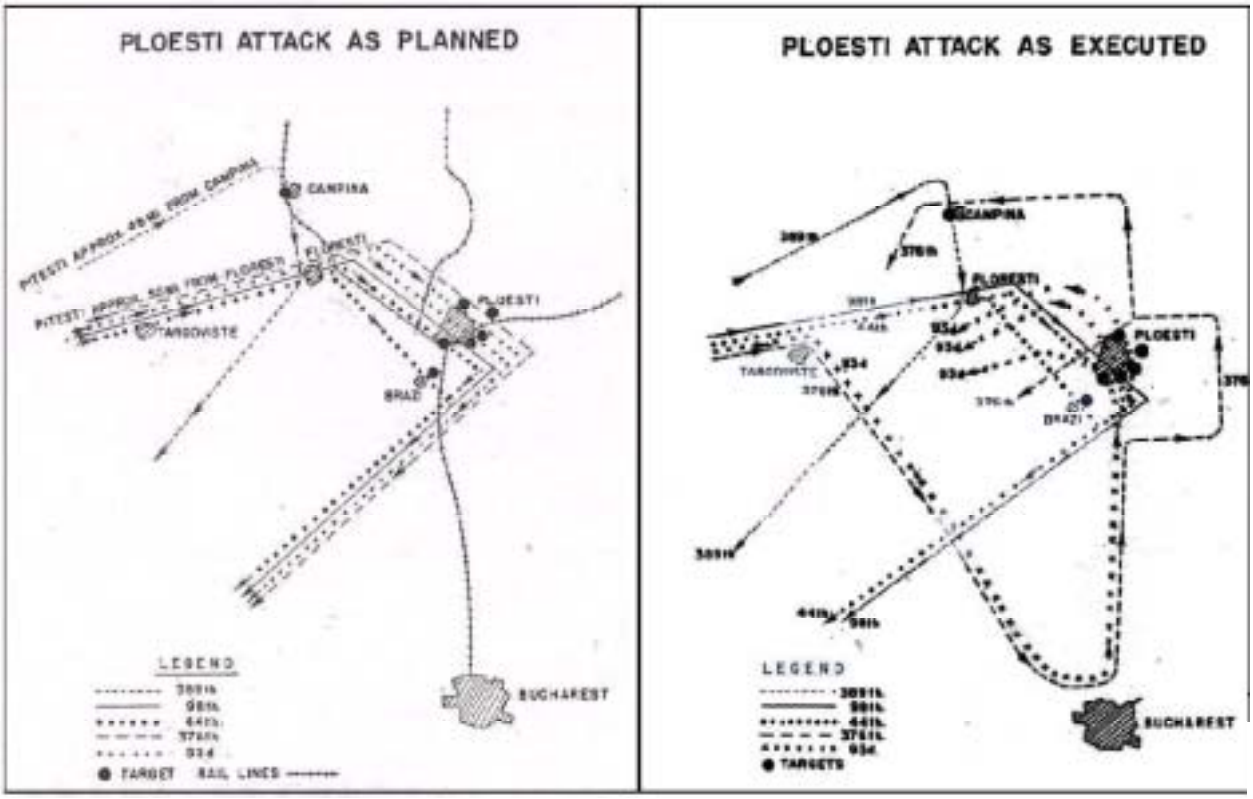

Figure 2 Planned and Executed Tracks of Bomber Formations

Source: Craven and Cate, 480.

The second wave of bombers now entered the target area still in correct order with the 98th leading the 44th and 389th. The 389th split off as planned to bomb Campina. Another navigation error was committed, but was soon corrected and the 389th completely destroyed its target at about 1215. The 98th and 44th had Ploesti in their sights just as the 93rd completed its opposite direction attack. Unfortunately, many of the targets were fully ablaze and defenses were in full fury. A flak train ran northwest to southeast paralleling the attack axis between the 98th and 44th groups. Both sides of the flak train cars dropped open revealing heavy guns. A withering barrage of AAA pounded

both formations before the aircraft gunners could destroy the locomotive.[30] Delayed fuse bombs were now exploding and thick black smoke covered the targets. Colonels Kane and Johnson, the two remaining group leaders, decided to press home their attack. The heat, explosions, towering chimneys, and barrage balloons took their toll on the attackers. Aircraft holed by flak and leaking fuel emerged from the target area fully ablaze. One element lost five of six aircraft over the target.

Figure 3 *Sandman* Emerges

Source: Michael Hill, *Black Sunday,* 1993.

All the while, Gerstenberg's fighters attempted to break up the formations leaving the target area. They methodically picked off the stragglers, but the B-24 flying low and in formation acquitted itself well defensively, claiming many fighter kills.

[30] Dugan and Stewart, 147-48.

The forces returning were hardly recognizable. Some bombers were in good shape, and flew formation the entire way home. The majority, however, struggled with battle damage, equipment malfunctions and climbed to whatever altitude the remaining engines and holed fuselages would yield. Of the 178 aircraft that took off, 54 were total losses, 41 to enemy action; a loss rate of 30 percent! Eighty-eight aircraft made it successfully back to Benghazi, completing the 2,400-mile mission in 13-14 ½ hours. [31] Of the 1,620 men on the mission, 446 men were killed, 79 imprisoned, and over 100 injured.[32] Other aircraft made emergency landings in Turkey, Cyprus, Sicily, and Malta.

After 285 tons of bombs were dropped in little over one half hour, post mission analysis concluded that an estimated 42 percent of Ploesti's total refining capability was destroyed. However, the Germans quickly repaired some sites and activated idle ones. The overall effect on the Germans was not nearly as severe as expected. Further, follow up plans for striking Ploesti were not implemented for eight months.[33]

On 5 April 1944, the U.S. Fifteenth Air Force and British 205 Group began the first of 24 high altitude bombing missions to finish off Ploesti. After over 6,100 sorties and 13,500 tons of bombs dropped, Ploesti oil output was a mere 10 percent of capacity. It cost an additional 223 bombers and their crews.[34] The "taproot of German might" had finally been eliminated.

Analysis

The fantastic stories of the 1 August 1943 Ploesti raid are well chronicled by the Air Force, individual survivors of the mission, and military historians. The Army awarded

[31] AAFRH-3, 97.
[32] Dugan and Stewart, 222. Of the returning crews, 54 were wounded. Stewart and Dugan state there were 70 wounded in Romanian captivity.
[33] Craven and Cate, vol. 2, 483. Bomb tonnage estimate was derived from planned tonnage (311) carried by 178 aircraft and the actual number of aircraft (163) that crossed the target. "Operation Tidal Wave: Ploesti August 1, 1943," Internet, available on line at http://orbat.com/site/data/historical/usa/operationtidalwave.html
[34] Mediterranean Allied Strategic Air Force, *Ploesti: Summary of Operations Results and Tactical Problems Involved in 24 Attacks Between 5 April-19 August '44,* (Maxwell AFB, Al.: Mediterranean Allied Strategic Air Force), n.p.

TIDALWAVE crews more combat decorations than any other mission, including five Congressional Medals of Honor. But what was the lasting impact? Did this combat lesson change the development of airpower? What should today's airman learn from the sacrifice of so many?

The immediate impact was that no other large bomber formations attacked from such low level.[35] Further, the plans by Gen Brereton to revisit Ploesti if the first raid was not highly successful did not materialize until eight months later.[36] The most probable explanation of this lapse of operational art and doctrine involved the need for force reconstitution, priority of effort, and the effect on morale of the crews who would have to go back.

Longer-term impacts can be understood if the context of the raid is further developed. The raid occurred during Operation HUSKY and therefore Ploesti was not the main effort. A calculated economy of force decision was made regarding the nature of the raid—one-time, low-level, maximum destruction. That was the only way to exact damage to a vital target, yet rightly give support to the joint campaign plan. There was also pressure to aid the Soviet Union against the Germans since the U.S. and Britain judged it too early to open a western front.[37] Further, the Air Force was interested in performing war-winning "independent" missions where it could strike directly at the heart of German centers of gravity well before ground forces could threaten the same

[35] B-29s attacked Japan from low altitude at night in trail formations in order to increase accuracy. They did not face the same flak and fighter threats as the 9th Bomber Command forces did.
[36] AAFRH-3, 37. When Brereton approved the low altitude mission, he fully intended to re-visit the target as required to achieve the planned level of destruction. The tactics used would be based on the relative success of the low altitude attack.
[37] Brereton's diary and AAFRH-3 both document concerns of senior US military and political leadership with aiding the Soviet Union since the Allies judged it too soon to open a western front.

centers. Consequently, the raid was just that, a raid. It was not a change in bombardment doctrine as envisioned by the Air Corps Tactical School.

There is no evidence that, had TIDALWAVE been successful, more bombers in other commands would have adapted low-altitude tactics. Indeed, the opposite is true. The Ninth Air Force bombers had already conducted single B-24 low-level attacks in the Mediterranean. Also, the Royal Air Force Bomber Command conducted a low-altitude daylight raid with heavy bombers on the submarine engine factory at Augsburg on 17 April 1942. Of the 17 Lancaster bombers that took off, 4 were shot down by fighters prior to the target, 3 were shot down by flak at the target, and 5 more were damaged highlighting early the dangers of daylight low-altitude bombing with heavy bombers.[38] After TIDALWAVE there was no effort to improve tactics and coordination to make subsequent large formation attacks more likely to succeed. TIDALWAVE was a calculated military risk recognized by wartime commanders, not the beginning of a change in doctrine. Based on the situation confronting combat commanders at the Air Force level, and the political pressures facing the commanders at the combined and joint force level, the decision to break high-altitude bombardment doctrine in favor of a low-altitude attack is justifiable; they had no illusions of the risks.

The decision to bomb Ploesti from high or low altitude was fundamentally a risk versus expected gain calculation. How the problem was framed influenced whether the planners would accept the additional risk of the low-level attack.[39] The planners and

[38] Edward B. Westermann, *Flak, German Anti-aircraft Defenses, 1914-1945* (Lawrence, Ks.: University Press of Kansas, 2001), 178.

[39] Robyn M. Dawes, *Rational Choice in an Uncertain World,* (Fort Worth, Tx.: Harcourt Brace College Publishers, 1988.), 34-35. In general, people are risk seeking when a problem is framed in terms of losses from a "status quo" position, and risk averse when a problem is framed in terms of gains from the status quo. People would rather choose a "sure thing" when offered gains, and gamble when offered losses. Further, if there is decreasing marginal utility (however utility is defined) for incremental gains and losses,

commanders looked at the raid from a broad perspective, calculating how the destruction of the target would influence the war. However, the commanders flying the missions looked at the raid from a narrow perspective, calculating how the potential loss of many bombers and crew would affect the units and further operations. Since people are more inclined to risk potential losses and husband potential gains, the decision to fly the Ploesti raid from low altitude was more likely to occur when viewed from both the broad and narrow perspectives.

Ploesti illuminates a critical characteristic of airpower—flexibility.[40] Air Force Doctrine defines flexibility as the exploitation of mass and maneuver.[41] At the operational level, flexibility is the ability to shift campaign objectives as required by circumstances. Although not unique in military operations, airpower may be uniquely suited to change missions and targets, and use weapons and platforms for other than designed purposes. From an ostensibly mature pre-WWII doctrine of high-altitude daylight precision bombardment, both surface and air commanders were able to imagine airpower striking new targets, by unique methods, in the midst of a different campaign. The trend is easily seen in a brief sweep through conflicts employing airpower. "Strategic" bombers first provided close air support to troops during Operation COBRA in 1944, then again in the Korean War. B-52s did the same during ARC LIGHT missions in Vietnam. The Gulf War saw the F-117 fighter-bomber destroy strategic targets while the B-52 worked over front line enemy positions. Finally, the precision deep strike F-

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then expected utility theory says that any gamble between two "positives" yields a lower utility than expected, and any gamble between two "negatives" yields a higher utility than expected.

[40] Robert J. Modrovsky, "1 August 1943—Today's Target is Ploesti: A Departure From Doctrine" (Maxwell AFB, Al.: Air University, 1999), 36.

[41] AFDD-1, *Air Force Basic Doctrine*, (1997), 23-24.

15E Strike Eagle was employed in a rare close air support strafing mission over Afghanistan.

Ploesti is in danger of giving us the wrong lesson in flexibility however. Platforms and weapons aside, the doctrine and operational art in which the flexible forces operate still has to be sound. Because airpower is flexible does not mean it should be employed at every opportunity, outside normal parameters and at odds with the campaign plan. If one looks at the Ploesti raid as a failure of heavy bombers to be tactically flexible enough to successfully make a low-level raid, justifiable military risks may not be taken when platforms do not closely match mission requirements. This concern cannot be overstated, and is a real problem for commanders and planners. However, if one views Ploesti as a failure of operational art, then strategy takes its rightful place as the primary factor in the art of war. Ploesti should remind airmen to ensure that unusually risky missions fit into the envisioned campaign plan toward the strategic end state. But risk is as much about perception as it is reality.

In sum, the lasting impact of Ploesti is a microcosm of the tension between fragile, yet potentially war-winning weapons, their very human operators and wartime command. When questioned in 1949 about "unacceptable" losses of bombers in 1943, General Hoyt S. Vandenberg replied that no attack was ever repulsed and that the difference between "acceptable" and "unacceptable" losses depended on "the destructive effect of bomber weapons and the value of the strategic target."[42] This trend continued with Strategic Air Command through the Cold War and graphically displayed in Vietnam. During Linebacker II, the B-52 Stratofortress performed daring raids over Hanoi's dense surface-

[42]Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960,* vol. 1, (Maxwell AFB, Al.: Air University Press, 1989), 154-155.

to-air missile engagement zones, losing 15 bombers in 11 days. It was a maximum effort for maximum gain in minimum time—just like Ploesti. Given the evidence of actual combat risks taken, leadership thinking, and the flexibility of airpower, it is likely the Air Force will continue accepting high-risk missions when the expected return is great enough. The challenge for airmen is to ensure these missions fit into the overall operational scheme.

Table 1 Bombing Technique Table

Source: Adapted from AAFRH-3

TECHNIQUE	ADVANTAGES	DISADVANTAGES
Low Altitude Bombing	1) Small targets can be hit 2) Concentration of bombs 3) Accuracy of targeting 4) Percent of effective weapons delivered to specific target 5) "Medium" altitude cloud cover and above would not affect mission 6) "Dislocation" of the whole target area by effective attack on some of the targets	1) Bombing method is new to crews, requires significant training 2) Low level maneuvering of large bomber in target area difficult 3) New technique may produce doubt in crews and therefore more turnbacks 4) Fear of enemy ground defenses may impact accuracy
Enemy Action	1) No danger from heavy flak 2) Little danger from fighters in target area 3) A higher degree of surprise may be expected 4) Surprise may neutralize a large portion of the enemy ground and air defenses, i.e., light flak, fighters, balloons and smoke 5) Mass of attack will have morale effect on defensive gun crews	1) Large bomber is slow and difficult to maneuver 2) In range of light flak and balloons 3) Risk of mid-air collision when hit by flak 4) Smoke screen more effective against low level attack 5) Bad luck or lack of surprise might easily result in very heavy losses of aircraft and trained crews with little damage to the target.
Abstract Advantages	1) Morale effect if able to destroy 1/3 of Germany's refining capacity	1) Importance of, and time to train 2) Adverse impact on morale if mission unsuccessful or disastrous
High Altitude Bombing	1) No extra training required 2) Confidence would assist mission performance 3) Expected collateral damage would be of value even though specific target aim point was missed	1) Accuracy on pin-points not nearly as high as from low level. 2) Improbable that one attack would suffice 3) Intense flak will cause evasive action, reducing accuracy 4) Medium cloud over the target would cause aborts
Enemy Action	1) No danger from light flak or balloons. 2) Midair collisions less likely from damaged aircraft 3) Evasive action vertically and laterally is practicable against flak 4) Smoke screens less effective 5) Consequences of lost tactical surprise lower	1) A very large concentration of heavy flak is reported in the target area 2) Probability of tactical warning to enemy is higher, increasing efficiency of flak and smoke screen 3) Enemy fighters will be in a better position to interfere with attack
Other	1) Attacks could begin immediately 2) Highly likely that a reasonably large force will get through and produce great damage 3) Any seemingly successful blow to so important an Axis objective will favorably affect the unity involved, the allied and the occupied countries	1) Multiple attacks may strengthen defenses over time, resulting in losses and turn-backs 2) Multiple missions with low losses could exceed losses from low attack 3) Multiple missions carry a greater opportunity cost 4) Multiple missions may allow Germany to capture significant petroleum product before production is seriously affected

Chapter 3

Berlin Airlift: Non-lethal Strategic Airpower

It was like a city of the dead. I must confess that my exultation in victory was diminished as I witnessed this degradation of man.

General Lucius D. Clay, USA
On the Red Army in Berlin, 1945

Introduction

On 17 July 1948, the first of 60 B-29 Superfortresses landed in Britain in response to the Soviet blockade of Berlin. The epitome of American strategic firepower and nuclear superiority would be sidelined in the first test of the Cold War. This time, Western political goals would be won, not by bombardment with high explosives and incendiaries, but with coal, flour and milk—life-giving essentials. The target of American airpower was not the Red Army in Berlin, but the hearts, minds and stomachs of an entire population. Aided by a porous border and an effective counter-blockade, Lieutenant General Curtis LeMay traded the B-29 for a C-47 Skytrain and began an airlift of unprecedented size that bought the required time for a solution to the crisis.

Situation

The context in which the Berlin airlift operated was a unique combination of economic, political and geo-strategic factors. Economically, the recovery of Europe after WWII was tied to the recovery of Germany. Politically, solutions to the economic problems were confounded by Soviet ambitions in the area. Geo-strategically, Berlin was deep inside the Soviet Occupation Zone of Germany. The position of Berlin gave the Soviets the opportunity to pressure the West to exact political concessions.

One of the important issues facing post-war Europe was the slow economic recovery, and in particular, the reintegration of Germany. The Red Army under Stalin pursued an occupation policy of retribution. In addition to $10 billion in direct reparations, the Soviet Union "systematically stripped those portions of Germany under its control leading to the loss of 3,500 plants and factories, 1,115,000 pieces of equipment, and 2 million industrial jobs." German skilled labor was evacuated to the Soviet Union and by 1947 the US concluded that Europe and Germany would not recover economically without a massive infusion of aid.[43]

The uncertainty of economic recovery led to political turmoil throughout Europe. The Communist Party made substantial gains in the Italian and French governments. Conversely, because of the harsh treatment by the Red Army, Berliners in the Soviet Sector were showing signs of discontent with the Communists. The result was a renewed determination of the Western powers to stabilize Europe economically, and for the Communists to assert more control in Berlin. The economic recovery plan proposed by the U.S. for Europe was the Marshall Plan. The Soviets saw it in a different light.

[43] Roger G. Miller, *To Save a City, The Berlin Airlift 1948-1949*, (Washington D.C.: US Government Printing Office, 1998), 6-8.

The European Recovery Act (Marshall Plan) announced 5 June 1947 by Secretary of State George C. Marshall was to the Soviets an overt attempt to permanently divide Germany and therefore thwart their attempts to consolidate Germany as a Soviet satellite.[44] Soviet intransigence over war reparations led the U.S. and Britain to end reparations to the Soviet Union from the Western Zones of Occupation and move forward with the economic recovery plan. Although the US and Britain desired a united Germany, Marshall cautioned, "[the] desire for an undivided Germany cannot be made an excuse for inaction in Western Germany, detrimental to recovery of Western Europe as a whole."[45]

The Marshall Plan received a boost of urgency from the February 1948 *coup d' état* in Czechoslovakia. The violent overthrow of a democratic outpost on Germany's southern flank confirmed the intentions and methods of the Soviet Union. The West moved quickly to establish a framework for a West German state government and integrate it into the other economies of Western Europe. The line between East and West was drawn on the border of the Soviet and Western occupation zones. There was one exception—Berlin.

Berlin was situated 100 miles deep within the Soviet Zone of Occupation—completely surrounded. Berlin itself was sub-divided into the Soviet, British, US, and French sectors. Rail, highways, and canals connected the western zones with Berlin. Air routes were also established and by a fluke of negotiation over air safety, guaranteed in writing with the Soviets. It was these tenuous ground links that the Soviets would exploit

[44] Harry S. Truman, *Memoirs by Harry S. Truman*, vol. 2., *Years of Trial and Hope* (Garden City, NY: Doubleday & Company, Inc, 1956), 120.
[45] Hans-Ludwig Paeffgen, *The Berlin Blockade and Airlift: A Study of American Diplomacy*, (Ann Arbor Mi.: University Microfilms International, 1979), 157. Also R. Miller, 9-10.

to pressure the West to abandon its efforts to link the German economy to Western Europe.

The first squeeze began on 1 April 1948. Upset over economic reforms, the Soviet Union restricted, boarded, and inspected cargo and passenger rail traffic from Berlin to the Western zones; they no longer honored written manifests. Although an armed response was contemplated, it was the "Little Lift" that was adopted and successful.[46] On 2 April General Lucius D. Clay, Commander in Charge (CINC) of European Command and military governor of Germany, ordered United States Air Forces Europe (USAFE) to supply the Berlin military garrisons by air. Lt Gen LeMay, CINC USAFE wisely re-deployed his 53rd Troop Carrier Squadron, flying the C-47, out of Tempelhof, Berlin to Rhein-Main Air Base near Frankfurt. Maintenance and command elements were also re-deployed. The Little Lift began operations and delivered up to 80 tons of perishables daily to the US military garrison in Berlin. Concurrently, the British began flying 65 tons of supplies to their own garrison.[47]

The impact of the Little Lift was three fold. First, it gave the US and British military planners a quick lesson on what was to soon grow in scale beyond their imagination. Work schedules, flying schedules, aircraft parts supply, cargo management, and many other processes were tested on a small scale. Next, during the Little Lift, barge and rail traffic into Berlin was increased to stockpile critical supplies. Surface traffic of coal exploded from 1,451 tons in March to over 10,000 tons in April and May. The extra coal

[46] Lucius D. Clay, *The Papers of General Lucius D. Clay, Germany 1945-1949,* (Bloomington In.: Indiana University Press, 1974), 600-610. Clay also discusses counter-blockade measures. Also, Paeffgen, 104.
[47] P. R. Wood, "Thirty Years On: A Reassessment of the Berlin Airlift," *Royal Air Forces Quarterly,* Vol 18, (Autumn, 1978), 226. Also R. Miller, 12-13.

would greatly relieve pressure during the winter of 1948-49.[48] Lastly, the Little Lift was incorrectly interpreted by the Soviet Union as an indication of future failure of the West in Berlin. The Soviets believed that the West was not unified enough to counter the political pressures in Berlin let alone meet the physical needs of Berliners by air.[49]

The proximate cause of the total surface blockade of Berlin came later that spring. Part of the economic revival program of Western Germany was currency reform. On 18 June 1948, the West informed the Soviets that they would introduce a new currency into the Western Zones of Occupation in Germany, but that it would not apply to Berlin. The Soviets countered with a strategy of harassment and a new currency of their own in the Soviet Zone, including Berlin. To counter the Soviet move, the Western currency was also extended to Berlin.[50] The Soviets escalated their propaganda campaign, incited riots in Berlin, and performed large military maneuvers. Finally, on 24 June, the Soviets prohibited all rail, barge and road traffic into West Berlin. On the 25th they announced that no food would be given to West Berlin, but Berliners could "register" in the Soviet sector for food.[51] With Berlin surrounded, 100 miles deep into the Soviet zone, Western politicians recognized the dilemma they faced. They needed time to negotiate a solution to the crisis. The airlift provided that time.

Mission

Although the scope and duration of the lift was initially limited, it quickly expanded. Gen LeMay, CINC USAFE was tasked by Gen Clay, CINC EUCOM and Military

[48] R. Miller, 13.
[49] Vojtech Mastny, *The Cold War and Soviet Insecurity: The Stalin Years,* (New York: Oxford University Press, 1996) 49. Some commentators also cite the failed airlift at Stalingrad during WWII as Soviet reason to doubt the viability of a large, sustained airlift.
[50] R. Miller, 18-19.
[51] R. Miller, 19.

Governor of Germany, to "utilize the maximum number of airplanes to transport supplies to Tempelhof Air Drome (sic) Berlin," for the purpose of feeding the population of West Berlin for a period of weeks at most.[52] At LeMay's disposal were two troop carrier wings, the 60th and 61st employing the war-weary C-47. Initial calculations of daily tonnage required rose from 3,800 tons for summer to 4,500 tons for winter. However, on 20 October, the requirement was raised to 5,600 tons.[53] Two thirds of the requirement was in coal and one quarter for food making up the majority of shipments. Other categories included industrial supplies, newsprint, liquid fuel, medical supplies, passengers, and military supplies.[54]

Administration and Logistics

The administration of personnel became a major problem as the scope and length of the airlift increased. Initially, the lift was regarded as a temporary USAFE operation. USAFE attached pilots from other USAFE units on a short 14-day temporary duty assignment , including some fighter pilots who had never flown large multi-engine aircraft. Soon, in order to meet daily tonnage requirements, more C-54 Skymasters arrived with crews from other commands and the length of temporary duty increased from 14 to 90 days. Eventually, by September of 1948, Headquarters Air Force extended all temporary duty to 180 days. In order to further stabilize the flow of personnel, volunteers were then taken to permanently change their duty station. Replacement aircrews from the Great Falls training facility were assigned to USAFE for 6 months on a

[52] Quoted in R. Miller, 23. Also, General Clay committed to the feeding the city while the Mayor of Berlin, Ernst Reuter committed to sacrifices on behalf of the population. Neither believed the airlift was viable in the long run.
[53] Charles E. Miller, *Airlift Doctrine,* (Maxwell AFB, Al.: Air University Press, 1988), 177-178.
[54] *Berlin Airlift, A USAFE Summary,* (Headquarters, United States Air Forces in Europe: USAFE Reproduction Center, 1949), 29.

"short PCS" (permanent change of station). After that period, they had the option to remain for a full tour. Replacement crews began arriving in November and produced about 200 pilots and 100 crew chiefs per month, and a more normal personnel rotation plan was implemented.[55]

The Army's Transportation Corps worked directly with the Air Force personnel and provided railhead operations, trucking, loading, and unloading support.[56] Loading and unloading operations were primarily handled by manual labor. Mechanical devices of all types including fork lifts, close positioning of trucks, conveyor belts and high-lift trucks were tried, but either proved awkward or a safety hazard.[57] However, 10-ton flatbed trucks hauled most of the loads to and from the aircraft, which perfectly matched the short haul capacity of the C-54.

Early in the lift, a new airport was planned in the French sector and on 5 August construction of Tegel airfield began.[58] "Over 17,000 Berliners, working three shifts for slightly over a [M]ark an hour and a hot meal, did the work."[59] They used the rubble from the streets of Berlin and American heavy equipment flown in on the lift to construct the new runway and ramp area. In three months to the day, airlift operations began at Tegel.

[55] *Berlin Airlift,* 122-23.
[56] *Berlin Airlift*, 5.
[57] *Berlin Airlift,* 34-35.
[58] R. Miller, 60.
[59] Quoted in R. Miller, 60-61.

Figure 4 Loading Operations From Rail to 10-ton Truck

Source: Giangreco and Griffin, *Airbridge To Berlin*

Command and Control

The American portion of the airlift occurred in the EUCOM area of responsibility under the command of Gen Clay as both CINC EUCOM and military governor of Germany. USAFE under Gen LeMay was tasked to perform the lift. The command structure went through some early changes from a USAFE headquarters operation to a provisional task force. On 29 June 1948, LeMay appointed a temporary commander of the airlift, Brig Gen Joseph Smith. Smith commanded for one month until Maj Gen William H. Tunner arrived and established the Airlift Task Force (Provisional) still under USAFE. Although LeMay and Smith only commanded the airlift for a short time, their contributions should not be minimized. Most of the basic processes were established by the time Tunner arrived.[60]

Tunner faced significant challenges as a task force commander drawing assets from disparate commands. MATS and the Navy controlled significant numbers of C-54s, crews, and maintenance personnel, while various troop carrier squadrons from around the

[60] David R. Mets, "The Berlin Airlift: The Microview From The Cockpit" 1999 presentation.

globe converged with aircraft and manpower. Materiel Command controlled parts supplies and major overhaul, and USAFE and EUCOM controlled basing and ground personnel. Tunner's excellent relationship with LeMay smoothed the command relationships however, but that was soon to change when Lt Gen John K Cannon replaced LeMay in mid October.[61]

The British and American airlift organizations were eventually combined in order to maximize efficiency and safety. The Combined Airlift Task Force (CALTF) was established on 15 October with an American commander and British deputy. Shortly thereafter, on 4 November, the American 1st Airlift Task Force headquartered in Wiesbaden was established for administrative control of US forces.[62]

Integral to the command and control of cargo was the Berlin Airlift Committee (BEALCOM). The committee established airlift and cargo requirements and priorities. Air Force staff elements of BEALCOM dispatched specific cargos to aircraft hardstands, controlled takeoff times, and monitored airlift control statistics.[63]

The American airlift operated from four primary bases in the occupation zones. Rhein-Main and Wiesbaden were in the American zone, and Celle and Fassberg in the British Zone. In Berlin, the aircraft landed at Tempelhof and Gatow in the American and British sectors respectively. Eventually, Tegel airfield opened in the French zone adding total airlift capacity, as well as relieving traffic at Tempelhof and Gatow.

[61] R. Miller, 51-53.
[62] *Berlin Airlift,* 3-4.
[63] *Berlin Airlift,* 31-32.

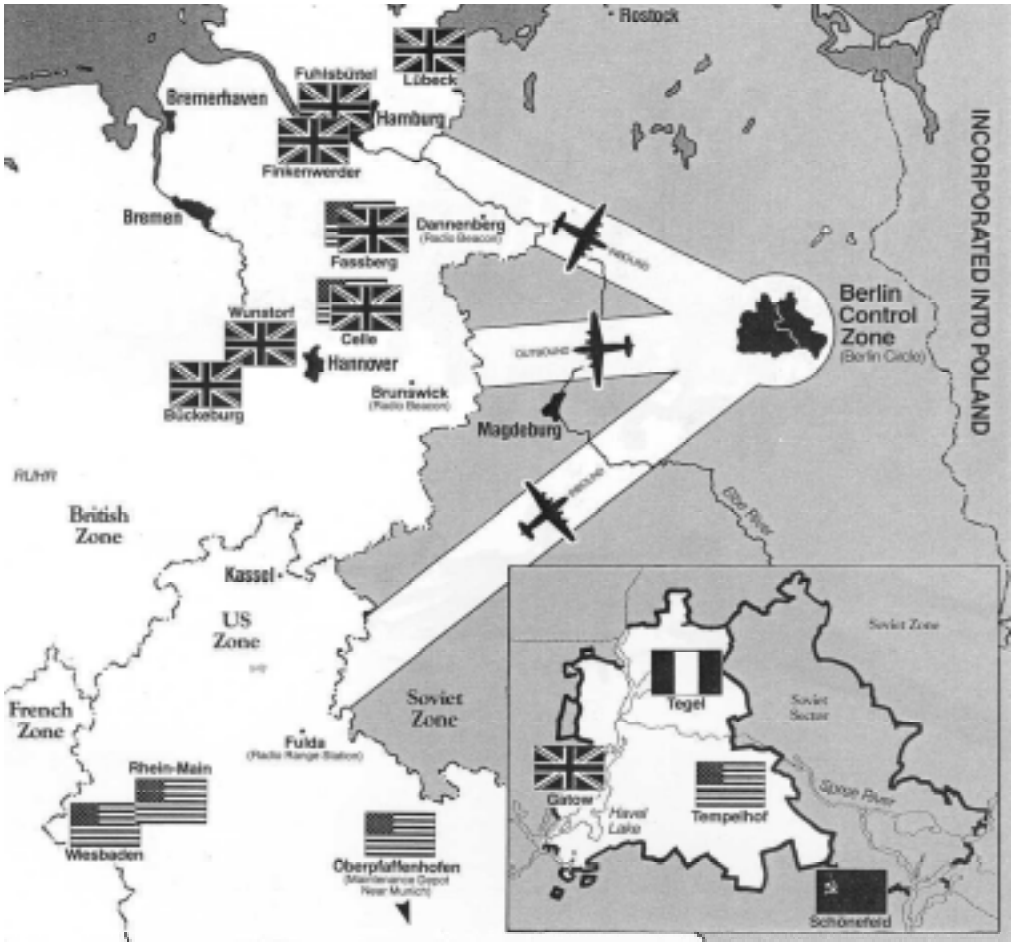

Figure 5 Corridor and Airbase Overview

Source: Giangreco and Griffin, *Airbridge To Berlin*

Execution

Unofficially called "Operation VITTLES" the Berlin airlift began on 26 June 1948. The execution can be characterized by the interaction of three main systems: aircraft and maintenance, flight operations, and traffic management. Each a complex system in and of itself, the efficiency of each system's internal operation and more importantly, their integration would determine the success or failure of the physical delivery of cargo.

LeMay immediately realized that the operation needed more ton-mile capacity. That meant large aircraft in large quantities. The very day the airlift began he requested the

early conversion of his two C-47 troop carrier groups to the C-54 and the immediate deployment of an additional C-54 group. He also asked General Clay to make the same request from his side.[64] By 30 June, 102 C-47s were available for use carrying only 2 to 2 ½ tons per flight.[65] Soon, the C-54 with its nominal 10-ton capacity began replacing the C-47. Initial calculations showed that 100 C-47s could lift approximately 100 tons each day and an initial fleet of 30 C-54s from the European theater could lift 500 tons—still well short of the requirement of 3,800 tons per day.[66] At Gen Clay's urging, President Truman ordered Air Force Chief of Staff, Gen Hoyt S. Vandenberg, to give the airlift his "fullest support possible to the problem of supplying Berlin." Gen Vandenberg initially objected, citing decreased worldwide airlift readiness, and the lack of runway space in Berlin to absorb additional C-54 traffic. Gen Clay assured President Truman and Gen Vandenberg that additional runways would be constructed so Gen Vandenberg ordered more C-54s to Germany to make up the shortfall.[67]

Gen Smith was responsible for the bed down of a new aircraft in theater and establishing initial flying and scheduling procedures. His "block" system safely separated the faster C-54s from the C-47s while they were in the corridor together. Further, Smith initiated construction of an additional runway at Tempelhof when the active runway began to show signs of wear from the large C-54s.[68] Although his command was short, Smith created the processes that Gen Tunner would expand and maximize to ensure the success of the lift.

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[64] R. Miller, 31.
[65] *Berlin Airlift*, 11.
[66] C. Miller, 177.
[67] Truman, 125-126.
[68] R. Miller, 32-34.

By 1 October 1948, Tunner had been in command for a mere 2 months and all C-47s were replaced by C-54s. By January 1949, the maximum number of C-54s employed, 225, were in place from various troop carrier, MATS and Navy squadrons. Sources differ, but it took between 319 and 324 of the Air Force's 400 total C-54 inventory to keep 225 C-54s flying.[69]

Two other American aircraft played a large part in the airlift. The twin engine C-82 Packet had a light four-ton capacity, but had a wide cargo floor and could be loaded directly from the rear, ideal for vehicles.[70] The more physically impressive aircraft was the four-engine C-74 Globemaster I. With a twenty-ton capacity, it was uniquely suited for "outsized" cargo—cargo that was bulky and not prone to easy loading or stacking. Only one C-74 flew the corridors during the lift due to maintenance difficulties and its punishing effects on the runways and taxiways. It made only 25 flights, yet carried over 18 tons per flight. The real contribution of the C-74 was in logistics. Its main function was to ferry spare C-54 engines from Kelly AFB, TX to Rhein-Main AB. R-2000 "Wasp" engine delivery increased from 2 per flight on contract air to 14 per flight on the C-74.[71]

Maintenance and maintenance logistics of the aircraft were a major factor in the execution of the airlift. There were four scheduled maintenance inspections to keep the fleet running safely—daily checks, 50 hour, 200 hour, and 1,000 hour inspections. The daily preflight check and the 50-hour inspection were performed at the operating locations. Heavy 200-hour maintenance was performed at Oberpfaffenhofen near

[69] C. Miller, 177-181.
[70] R. Miller, 61-2.
[71] D. M. Giangreco and Robert E. Griffin, *Airbridge to Berlin: The Berlin Crisis of 1948, its Origins and Aftermath*, (Novato Ca.: Presidio Press, 1988), 145.

Munich, Germany until the main depot in Burtonwood, England opened. Aircraft due the 1,000-hour check flew back the US for complete overhaul.[72]

The 200-hour maintenance inspection was critical for aircraft safety, its long-term viability, and increasing its load capability. Originally designed for long-haul operations, the airlift forced the C-54 to make all short cycle trips at near maximum gross weight. That put an unusual strain on engines, tires, brakes, and nose gear. Nearly 600,000 flying hours and over 575,000 landings were accomplished on little more than 300 aircraft for a utilization rate of 8-10 hours per aircraft per day.[73] Further, a thorough cleaning inside and out attempted to minimize the damage done by the abrasive coal dust that permeated every crevice. Maintenance crews also stripped off approximately 2,200 lbs of excess weight, further increasing load capacity.[74] The inspection throughput was a major factor in scheduled maintenance and drove the aircraft availability rates—an average of 196 aircraft were in the maintenance system at any one time. That left 128 C-54s to fly the corridors.[75] Compounding the problem, the C-54 was new to the theater, replacing the C-47. Consequently, the parts supply system, maintenance infrastructure and mechanics in USAFE required additional training and reorganization.[76]

When Gen Tunner took command of the airlift with an entourage of veterans from the China-Burma-India "Hump" operation, he sought to squeeze every ounce of efficiency from the so-called "cowboy" operation. His headquarters was first, Tunner demanded 15-hour days from his staff. Next he dispatched his entire staff (himself

[72] R. Miller, 72.
[73] *Berlin Airlift*, 92.
[74] *Berlin Airlift*, 34.
[75] *Airbridge*, 127-129.
[76] R. Miller, 71.

included) to fan out into the work places and return with observations.[77] Tunner was searching for a sustainable rhythm.

The actual operation of a successful airlift is about as glamorous as drops of water on stone. There's no frenzy, no flap, just the inexorable process of getting the job done. In a successful airlift you don't see planes parked all over the place; they're either in the air, on loading or unloading ramps, or being worked on. You don't see personnel milling around; flying crews are either flying, or resting up so that they can fly again tomorrow. Ground crews are either working on their assigned planes, or resting up so that they can work on them again tomorrow. The real excitement from running a successful airlift comes from seeing a dozen lines climbing steadily on a dozen charts—tonnage delivered, utilization of aircraft, and so on—and the lines representing accidents and injuries going sharply down. That's where the glamour lies in air transport.[78]

Tunner standardized briefings, corridor procedures, approach procedures, training, and evaluation of personnel. Prior to each flight, the pilots would be briefed on current conditions. The briefing included their flight clearance, weather forecast, notices on hazards en route and at their destination, weight and balance of the aircraft, corridor harassment activity from the Soviets, charts, and emergency procedures.[79] Because of the density of air traffic and the poor German weather, strict adherence to flight procedures was mandatory. Tunner went so far as to threaten to court martial any pilot

[77] William H. Tunner, *Over The Hump,* (New York: Duell, Sloan and Pearce, 1964), 162.
[78] Tunner, 167.
[79] The Soviets conducted minor harassment of air traffic in the corridor including sporadic AAA, buzzing from fighters, and bright search lights aimed at aircraft landing at night. One Soviet fighter collided head-on with a British transport in the northern corridor killing all on board. Also, Dr. David R. Mets writes a detailed account of crew life and flying the corridor based on official wing histories in "The Berlin Airlift: The Microview From the Cockpit" 25 January 1999. [School of Advanced Air and Space Studies, Maxwell AFB, Al.]

who could not land exactly at the minimum cloud ceiling.[80] Similarly, standard and abbreviated radio procedures were implemented to reduce radio traffic in constantly congested airspace.[81] Crews were standardized in procedure by frequent flight checks that not only included instrument procedures, but also operations procedures that maximized engine and equipment life. Replacement crews were trained at Great Falls in a simulated corridor airlift scenario. Aircrew and ground controlled approach (GCA) discrepancies, as well as common emergencies were emphasized in training.[82] His incessant work ethic and drive for perfection earned him the nicknames "Mr. Airlift," "Tonnage Tunner," and "Willie the Whip."[83]

Three established air routes controlled orderly flow into Berlin. The northern route went east, inbound from the British Zone with Celle and Fassberg traffic. The southern route also went east inbound, but from the American Zone with Rhein-Main and Wiesbaden traffic. The Middle route was westbound only from Berlin to the Braunschweig navigation beacon. From there, traffic would split north or south to their respective home bases.[84] Each corridor had radio navigation aids and mandatory reporting points to separate traffic. Further, ground radar and approach control aided terminal traffic. All three Berlin airports were within six miles of each other.[85]

Traffic in the corridor was regulated by strict adherence to takeoff times as well as climb, cruise and descent speeds. Early in the lift there was a wide discrepancy between the cruise speeds of the C-47 and C-54. To eliminate that problem, aircraft with similar

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[80] Tunner, 173. Tunner never actually carried out the threat, but the point was clear—be as near perfect as possible.
[81] *Berlin Airlift*, 24-26.
[82] *Berlin Airlift*, 23-4.
[83] R. Miller, 50.
[84] *Berlin Airlift*, 23.
[85] C. Miller, 180.

speeds were launched in "blocks" followed by appropriate spacing until the next block was safe to takeoff. There was no radar separation in the corridors. Later, when the C-47 was completely replaced, the traffic resembled a conveyor belt with an aircraft spaced every 3 minutes.[86] The British maintained the block system in their corridor because they continued to operate several types of aircraft.[87]

Terminal procedures were also improved. Early in the lift, aircraft would stack up in holding if they missed an approach due to weather or other factors. It may take hours to land a stack of aircraft if the weather was poor, let alone the inherent safety hazard of dozens of aircraft holding in poor weather. Tunner implemented a plan that kept the conveyor belt moving. If a pilot missed an approach for any reason, he would return to his original base, giving the next aircraft a chance to land.[88] The flow process was more important than landing that particular load in that particular sequence or time. Radio navigation aids were upgraded aiding corridor and terminal navigation. New approach lighting aided landings in the notoriously poor German weather. Radar was installed at Tempelhof that aided spacing of traffic within 85 miles of Berlin.

The GCA system was heralded as probably the best single technical contributing factor to the success of the airlift.[89] The GCA operators would direct traffic down steep glide paths through low clouds, fog, rain, and snow to the runway threshold. The mutual trust between the ground controllers, pilots, and their respective equipment was crucial to maintain flow of traffic and the extraordinary safety record during the airlift.

[86] R. Miller, 62-3.
[87] Wood, 229.
[88] Tunner, 172. Also Wood, 231.
[89] *Berlin Airlift*, 45.

Operations were designed to maximize the load and loading of aircraft. A mix of low and high-density cargo was loaded on each aircraft such that the maximum weight load was achieved when the aircraft was physically full. The average turn time at a loading base was 1 hour and 25 minutes, which included fueling, pilot briefing, and loading. The turn time at the download base in Berlin took an average of 49 minutes. There, the aircraft did not take on fuel.[90] Further, standard weight and balance forms were developed for each aircraft and load type.

All these actions to increase the capacity and efficiency of the airlift ensured the success of meeting the required daily tonnage delivered. With an efficient system of systems in place, and excess capacity developing, the airlift could run for the foreseeable future.

Figure 6 Success Defined in Another Way

Source: Giangreco and Griffin, *Airbridge To Berlin*

[90] *Berlin Airlift*, 32-33.

With the economic separation of West Germany continuing unabated and negotiations to establish NATO solidifying, it was apparent as early as the winter of 1948-49 that the Berlin blockade was not furthering Soviet political goals. Moreover, the counter-blockade of coal, steel, foodstuffs, and manufactured goods was taking its toll in East Berlin and the Soviet Zone of Occupation. The Soviets had no response. Not wanting to risk war, the Soviets moved for a diplomatic settlement by late January 1949. Stalin's demand of not establishing a West Germany was unacceptable, and the West used their luxury of time and world opinion, bought by the airlift, to hold out for further concessions. Eventually, Soviet demands were dropped and the settlement to end the blockade on 12 May 1949 was hammered out. The Soviets, however, continued to harass overland travel and the airlift continued in order to stockpile emergency supplies. Finally, on 28 July 1949, President Truman directed the phase-out of the airlift with the caveat that infrastructure be maintained to quickly reestablish the lift if required. The last flight was flown on 30 September 1949, with the lift officially closed the next day.[91]

The statistics of the lift remain impressive even by today's standards. In total, 277,569 sorties were flown, 189,963 by US aircraft and the balance by the British. The US lifted 1,783,572 of the 2,325,509.6 tons, or about 77 pecent. The US main effort was in coal—1,421,118 tons lifted. Too, over 80,000 tons of cargo came out of Berlin along with 227,655 military and civilian passengers. Pilots were aided by GCA control over 75,000 times, nearly 4,000 under low-cloud conditions.[92] Even under poor weather conditions and non-stop operations, the Berlin Airlift was significantly safer than worldwide Air Force operations. At times, the accident rate was only 10 to 20 percent of

[91] R. Miller, 103-08.
[92] R. Miller, 108-09.

the worldwide rate. However, the overall safety of the operation does not diminish the inevitable loss of life. The US had a total 76 major accidents, 12 were fatal, killing 31 Americans.[93] The British tallied 46 accidents and 17 killed.[94]

Analysis

After such an enormous and sustained effort that still holds the total sortie and tons moved records, how did the Air Force change? Was there lasting impact? How does the experience illuminate today's Air Force? What should today's airman learn from the use of non-lethal strategic airpower?

The immediate impact of the airlift, internal to the Air Force, was a push from Gen Tunner and Gen Kuter, MATS commander, for larger cargo aircraft and consolidation of the long-haul operations under MATS. Although Tunner takes the credit for large aircraft advocacy to the Secretary of the Air Force Stuart Symington, the massive YC-97 and C-124 were already in design and production during the airlift. However, the airlift did create enormous amount of data supporting the economies of scale for larger aircraft.[95] Indeed, a plan to supply Berlin by air for three years was predicated on the YC-97 and C-124 being the prime movers.

The Air Force continued to produce larger aircraft increasing its ton-mile capability an order of magnitude from the Berlin airlift through the Gulf War.[96] The trend has leveled off, however, due to the limitations of airfield infrastructure. The C-5, first produced in 1970, carries about 13 times the load of a C-54 at over twice the speed (135

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[93] *Berlin Airlift*, 64-68.
[94] Wood, 238.
[95] Tunner, 200.
[96] Thomas A. Keaney and Eliot A. Cohen, *Revolution in Warfare? Air Power in the Persian Gulf*, (Annapolis, Md.: Naval Institute Press, 1995), 154,155. Million Ton Mile (MTM) comparisons: China-Burma-India "Hump" airlift—0.9MTM, Berlin Airlift—1.7MTM, 1973 Israeli re-supply—4.4MTM, Gulf War—17MTM.

tons at 450 knots). However, similar to the problems of the large C-74 in 1949, the C-5 is unwieldy at small airports and is unsuitable for anything but large hardened runways, taxiways, and cargo ramp areas. The infrastructure requirements limits airport usage and a larger aircraft would further limit the options available. Therefore, in order to increase efficiencies through forward deployed, less prepared runways, the Air Force took delivery of its first C-17 in mid-1993. Although smaller than the C-5, it still carries 8 times the load of a C-54 and can operate from dirt runways and cargo ramps. A larger tactical airlift aircraft is unlikely since the limit is probably somewhere between the C-17 and C-5.

Like Tunner in 1948, the Air Force sees the aircraft as only one portion of a multi-factor cargo movement equation. The Air Force also considers the speed of loading, unloading, refueling and the size of the handling footprint on the cargo ramp. Relatively minor investments in cargo handling equipment and simultaneous servicing operations can create capacity without purchase of a new more expensive aircraft. Further, if one views not the movement of cargo, but the movement of combat capability, then another avenue of efficiency is revealed. Both the Army and Air Force are reducing the size and weight of their systems, yet providing the same or greater combat capability for the express purpose of aiding air mobility.

The airlift also enlightens us to Air Force issues of routine operations and problem solving. During routine operations, airpower is engaged in the act of its mission, whether that is delivering cargo, air refueling, dropping bombs, or shooting missiles based on best practice training and doctrine. The success of the routine operations is determined primarily by the efficiencies of the methods used. Problem solving is routine operations,

except tailored to the tactical situation. Problem solving occurs in response to, and anticipation of, strategies and tactics of a thinking enemy. All operations have more or less routine and problem solving components. In the case of the airlift, it was predominantly a routine operation. The Soviets did harass the airlift to some degree, but it was not relevant in the long run. What mattered was solving dozens of small problems that created frictions in the system of systems. However, once a problem was "solved," it usually remained solved.

Combat operations have the highest problem-solving component, but still rely on routine efficiencies. The most obvious example is sortie generation. Generation is a system of systems including maintenance, logistics, weapons, briefing, crew rest, airfield operations etc. Knowing the relative balance of routine to problem solving operations can help determine where to focus efforts for a more effective operation.

The airlift had strategic implications that are still relevant today. The airlift "attacked" several of the centers of gravity of the Soviet strategy. First, the physical needs of Berliners were exploited by the Soviets to put pressure on the West. The airlift supplied those needs. Next, time and timing was critical. Diplomacy is notoriously slow, but the potential disaster of starving and freezing people requires prompt action—promises would not do. The airlift again gave the politicians time to negotiate. Lastly, the Soviets use a concerted propaganda campaign against the West to justify the blockade and bolster their political position. They cited post WWII agreement minutia and interference with Soviet Zone affairs. However, the U.S. recognized early the need for public support of the lift and publicly stressed the "gross irresponsibility of a policy which resorted to cutting off supplies for more than two million Germans in order to

achieve its expansionist aims."[97] The Germans solidified in an "upsurge of pro-Western sentiments, prompted by the blockade and the airlift" and was in no small measure responsible for Berliners holding out during the siege.[98] Ultimately the blockade "backfired" on Stalin and the airlift was considered a "phenomenal practical and political success."[99]

There are other examples of non-lethal strategic airpower imparting influence on centers of gravity. Reconnaissance, the first use of military aviation, is a good example. Though usually associated with support roles by providing targeting and intelligence for other US forces, reconnaissance has by itself altered events. Probably the most famous example was the discovery of Soviet missiles in Cuba in 1962 by a U-2. Certainly targeting intelligence was performed over Cuba by other U-2 and RF-101 flights that supported potential lethal airpower, but the fact that the missiles were discovered was the central issue, not where on Cuba they were. The Soviet *fait accompli* did not occur because the missiles were discovered before they were operational. Other examples of reconnaissance having strategic impact were the U-2 and early reconnaissance satellites debunking the bomber and missile gaps between the Soviet Union and the U.S. The U.S. was able to make major budget and force structure decisions based on intelligence gained by reconnaissance. This trend continues today as air and space borne reconnaissance platforms play a central role in assessing the strategic capabilities and intentions of our adversaries. The advantages cannot be overstated.

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[97] Avi Shlaim, *The United States and the Berlin Blockade, 1948-1949: A Study in Crisis Decision-Making,* (Berkeley Ca.: University of California Press, 1983), 112-14, 157-58.
[98] Mastny, 50.
[99] R. Miller, 105.

Another example of non-lethal strategic airpower is mobility. Although air mobility is normally associated with supporting employment of lethal forces, the very fact that US forces can be moved in such quantity and speed can change the calculus of an enemy at the highest levels. An example of this is the October 1994 re-deployment of US forces to Kuwait and Saudi Arabia in response to Iraqi troop movements toward the Kuwaiti border. Additionally, mobility allowed US air and land forces to deploy quickly and decisively into Central Asia during Operation Enduring Freedom.

The airlift does illuminate another constant in the Air Force. The concept of requirements exceeding capacity is central to non-lethal airpower. Whereas the use of lethal airpower is usually relatively confined, except in the direst national emergencies like WWII, the widespread use of non-lethal airpower is becoming more prevalent. Peace keeping operations, humanitarian airlift, global reconnaissance, air refueling, special operations, and military operations other than war (MOOTW) are taking their share of airpower at an increasing rate. If the U.S. continues its national policy of global engagement, the use of non-lethal airpower is likely to increase. New horizons are evident in the space and information realms. While the combat forces may be training for hostilities, non-lethal forces perform their "wartime" missions daily. Non-lethal airpower assets should be developed and deployed based on their strategic contribution and frequency of use.

Chapter 4

MiG Alley: Battling MiGs and Sanctuaries

> *He looked over at me, raised his hand and shook his fist. I thought, "This is like a movie. This can't be happening!" He had led me right onto Tak Tung Kau Airflield [China]. I blew about four feet off his left wing. It exploded in fire. He leveled off, still doing about 350 knots, touched the ground and came unglued. Little pieces flew everywhere.*
>
> Major Robinson Risner, 4 December 1952
> Situation

In a pre-dawn surprise attack on 25 June 1950, the North Korean Peoples Army (NKPA) crossed the 38th parallel, overran Kaesong, and began their march to Seoul while the North Korean Air Force (NKAF) strafed South Korean airfields. General of the Army, Douglas MacArthur, Commander in Chief, Far East immediately ordered an evacuation of US citizens by air and sea with the U.S. Far East Air Force providing air cover. On 27 June, F-82 Twin-Mustangs shot down three NKAF Yak fighters and F-80 Shooting Stars shot down 4 Il-10 attack aircraft scoring the first aerial victories of the war. No US aircraft were lost to aerial combat, and all US citizens were safely evacuated.[100] However, this was only the beginning of the struggle to gain and maintain air superiority over the Korean peninsula.

The Korean peninsula was divided arbitrarily at the 38th parallel following the surrender of Japanese occupation forces in 1945. The Soviet Union disarmed Korea

[100] *MiG Alley*, 3-4.

north of the 38th parallel, and the US, south of the line.[101] As the post-war relationship between the U.S. and Soviet Union soured, the 38th parallel became more than a border, but a line separating two ideologies. By the summer of 1948, the UN officially established two separate countries, the Republic of Korea in the south, and the Democratic Republic of Korea in the north.[102]

The political situation in Korea steadily deteriorated. Cross-border skirmishes erupted and North Korean guerillas infiltrated into South Korea. President Syngman Rhee of South Korea attempted to crush opposition to his government, whether from North Korea or from within. When the U.S. began a phased troop withdrawal, and made statements interpreted to exclude Korea from its sphere of influence, the prospects of Korean unification under a Communist government looked all the more promising.[103] The conditions were set for military reunification.

When war broke out, events moved quickly for MacArthur and President Harry S. Truman. MacArthur lobbied quickly for authority to use air, sea, and land forces to protect South Korea. At first he was granted authority to use force below the 38th parallel to protect US interests. Further, while the Soviet delegate to the U.N. was boycotting the assembly, the UN voted to "…furnish such assistance to the Republic of Korea as may be necessary to repel armed attack and restore international peace and security in the area."[104] While North Korean aircraft continued to strafe South Korean bases, on 30 June

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[101] Wayne Thompson and Bernard C. Nalty, *Within Limits, The U.S. Air Force and the Korean War,* (Washington DC.: US Government Printing Office, 1996), 1.
[102] Judy G. Endicott, Ed., *The USAF in Korea, Campaigns, Units and Stations, 1950-1953,* (Washington DC: US Government Printing Office, 2001), 7.
[103] Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960.* (Maxwell AFB, Al.: Air University Press, 1989), Gen Douglas MacArthur and Secretary of State Dean Acheson both stated that the U.S. considered its defensive line to run form the Philippines, through the Ryukyu Island chain, Japan, to the Aleutian Islands, thereby interpreted as excluding Korea.
[104] Quoted in Futrell, *Ideas,* 293.

1950 MacArthur was finally given authority to employ airpower above the 38th parallel. Although MacArthur garnered authority for the use air and eventually ground forces on the entire peninsula, the war was characterized by political limitations.

From the outset, Truman and Acheson sought to confine the war to the peninsula because of the risk to the U.S. and her allies of general war with the Soviet Union. Truman wrote, "Every decision I made in the Korean conflict had this one aim in mind: to prevent a third world war…This meant that we should not do anything that would provide the excuse to the Soviets and plunge the free nations into full-scale all-out war."[105] Consequently, the Far East Air Forces (FEAF) was restricted, and not able to target forces in Chinese territory. The impact was to force the FEAF to fight outside its WWII combat tested doctrine.[106] The struggle for air superiority in a small corner of the North Korean peninsula was symptomatic of those limitations.

The air forces that battled for air superiority fell into three groups, the initial forces possessed by North Korea and FEAF, the introduction of the Chinese MiG-15s and US F-86A, and finally the improvements to the F-86.

The North Koreans opened the war with 62 Il-10 ground attack and 70 Yak-3 and Yak-7 fighters. All were vintage WWII aircraft. The Fifth AF made available 96 of the jet-powered F-80 Shooting Stars and 32 F-82 Twin Mustangs. Other US forces in the theater were reserved for the defense of Japan, Okinawa, and the Philippines.[107] Although the F-80 had a short combat radius, only 100 nautical miles (nm), and only 225

[105] Quoted in Futrell, *Ideas,* 294.
[106] Thomas C. Hone, "Korea," in *Case Studies in the Achievement of Air Superiority,* ed. Benjamin F. Cooling (Washington DC.: US Government Printing Office, 1994), 453.
[107] Hone, 459-60.

nm with wingtip tanks, the jets were far superior to the reciprocating engines of the Ils and Yaks. But that was soon to change with the introduction of high performance jets.

The second group of forces to contest air superiority was the MiG-15 and the F-86A Sabre. Though the US still fielded the F-80, F-84, and the Navy's F9F, the Sabre was the primary aircraft used to combat the MiG. The Chinese MiG-15 was lighter, had a more powerful engine, could climb higher, and turn better at high altitudes. It was armed with twin 23-mm weapons, and one 37-mm gun that delivered a lethal punch, but at a slow rate of fire. The MiG also exhibited poor high-speed turning characteristics and visibility problems including canopy icing. The F-86A exhibited better stability and a higher dive speed. Armed with 6x.50 caliber guns, it had a higher rate of fire, but shorter lethal range. Compared to the F-86A, the MiG was formidable indeed. Further, the MiGs outnumbered the Sabres and operated closer to their bases in China.

The third group of fighter aircraft involved an improved Sabre. The E and F models edged closer to the performance of the MiG and in some aspects, exceeded its capabilities. The E model introduced all powered flight controls, which made the Sabre more nimble and even easier to fly. This was especially valuable during turning engagements and in high-speed dives. By the fall of 1952, the F model Sabre was introduced to the theater. Improvements included a more powerful engine, gun ranging radar and a larger, stronger wing. The so-called '6-3' wing added six inches at the wing root, and three inches at the tip. Further, the E models were retrofitted with the '6-3' wing via a kit installed by field maintenance. The F model had an additional 1.5 Gs available above 35,000 feet and nearly the acceleration of the MiG.[108] The raw

[108] Larry Davis, *The 4th Fighter Wing In The Korean War,* (Atglen, Pa.: Schiffer Military History, 2001), 166.

performance characteristics of the two aircraft were now very similar, except that the Sabre had a higher rate of fire and was much easier to fly in combat.

Figure 7 Korean Peninsula

Source: Hone, 456.

Mission

On 7 July 1950, the commander of FEAF, Lt Gen George E. Stratemeyer tasked the Fifth Air Force under Maj Gen Earle E. Partridge with gaining and maintaining air superiority over Korea.[109] Just two days later, a clarification memorandum directed the Fifth Air Force to maintain air superiority over South Korea, and later the entire "combat

[109] Hone, 461.

zone, except for areas in amphibious operations" by destroying aircraft in the air and on airfields. Bomber command was to support the effort by hitting airfields, but both commands had a 50-mile target exclusion zone south of the Chinese border.[110] Fifth Air Force also was tasked with attack missions in order to isolate the battlefield and disrupt transportation. Relative mission weighting was in the following order: maintenance of air superiority, isolation of the battlefield, close air support, air defense of Japan, reconnaissance, troop carrier operations and finally fighter escort.[111] A further mission directive from Stratemeyer to Partridge made air superiority the top priority, followed by the air defense of Japan, and support of ground forces. Direction to coordinate with Bomber command on missions above the 38th parallel was also given.[112]

Administration and Logistics

Early in the conflict, the FEAF was plagued with personnel shortages exacerbated by lack of training for those deployed. Specifically, a 1951 Air War College Staff Study stated that personnel shortages were acute in "armament, intelligence, communication, engineering units, and personnel for the construction of base storage."[113] Further, the uneven rotation schedules and inconsistent personnel policies affected morale. Misuse of

[110] E. E. Toro, Adjutant General, HQ Far East Headquarters, letter to Fifth Air Force, subject: Mission Directive, 17 October 1950. *FEAF Operations History,* (Combat Operations Division, Directorate of Operations, Headquarters, Far East Air Forces. Volume 1 25 June 1950 through 31 October 1950, Annex 7, page 267. Document is now declassified. AFHRA number MU36511U Maxwell AFB, Al.

[111] Brig Gen Jarred V. Crabb, Deputy for Operations, Far East Air Forces, memorandum for Lt Gen Stratemeyer, commander Far East Air Forces, subject: FEAF Employment Doctrine, 9 July 1950, 258-260.

[112] Lt Gen George E. Stratemeyer, commanding general, Far East Air Forces, mission directive for commanding general Fifth Air Force, subject: Mission Directive, 12 July 1950, 262.

[113] Quoted in "Air War College Staff Study, Subject: An Analysis of the Barcus Report, 30 July 1951, enclosure 1 to letter from Air University Commander to USAF Director of Requirements, Subject: Analysis of the Barcus and Stearns Reports, 1 August 1951., 3. AFHRA 951.904248. Document is now declassified.

airlift theater airlift assets exhausted capabilities.[114] The Army was supposed to supply aviation engineering services for construction of airfields as well as Transportation Corps personnel to load and unload cargo.[115] However, those services were not forthcoming. Many problems existed because largely tactical units were forward deployed without sufficient wing personnel structure to handle problems.

Conditions for the FEAF were poor, especially on Korean bases. Many airfields did not have taxiways, and their parking areas did not have hangars. Maintenance was performed outside in all weather conditions. Personnel lived in near field conditions and had little field training to prepare them for this environment. Consequently, FEAF had difficulty keeping aircraft mission ready.[116] When the FEAF deployed the new F-86E, the operational testing was not complete. The Sabre in-commission rate fell to only 45% for lack of specialized maintenance and parts supply.[117] During the war, however, maintenance greatly improved with the rear echelon maintenance combined operations (REMCO) facilities built in Japan.[118]

Command and Control

The Korean War was fought under the auspices of the U.N., the bulk of the forces being South Korean and American. Gen MacArthur was the Commander, United Nations Command and of all US forces under Far East Command. The commander of the FEAF was Lt Gen George E. Stratemeyer until May of 1951 when health problems sidelined him and Lt Gen Otto P. Weyland took charge on 10 June. Fifth Air Force had

[114] Analysis of Barcus Report, 9.
[115] Analysis of Barcus Report, 9.
[116] Hone, 457.
[117] Hone, 488.
[118] Hone, 492.

responsibility for air operations in Korea and Japan under the command of Maj Gen Earle E. Partridge. The command passed to Maj Gen Frank F. Everest on 1 June 1951 and again to Maj Gen Glenn O. Barcus on 30 May 1952.[119]

Command and control surfaced as a thorny issue during the Korean War. Initially, according to historian Robert Futrell, the Far East Command did not have a land component staff, but MacArthur personally commanded both the theater and land component at the General Headquarters Far East. Further, the headquarters was staffed almost entirely by Army personnel.[120] The result was that airmen had to request air support via GHQ, that request then went to FEAF, then finally to Fifth Air Force, a process of almost four hours.[121] Still, when MacArthur established a separate army headquarters in Korea, (US Army Forces in Korea, USAFIK) on 4 July 1950, and directed the Army to contact FEAF directly for air support, it eliminated only one layer of coordination.[122]

Coordination between the Navy, Marines, and Air Force was also initially poor. MacArthur delegated "coordination control" to the FEAF when Seventh Fleet's Task Force 77 aircraft flew missions with Air Force aircraft. The command relationship was vague and open to interpretation by the different services. Further, "[Gen] Partridge tried to get the Navy to conform to Fifth Air Force operating procedures, but that proved impossible due to service differences in technology, attitudes, and practices."[123] Gen Partridge subsequently divided up the airspace over Korea to separate sections for the Air

[119] Thompson and Nalty, 4-5, and Futrell, *Korea*, 483.
[120] Robert F. Futrell, *The United States Air Force in Korea, 1950-1953*, rev. (Washington DC.: US Government Printing Office, 1983), 45.
[121] Futrell, *Korea*, 45.
[122] Futrell, *Korea*, 45.
[123] Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953*. (Lawrence Ks.: University Press of Kansas, 2000), 28.

Force and Navy.[124] According to Gen Stratemeyer, there was also a control issue over Marine air. The X Corps commander, General Edward Almond, launched "persistent attempts to control Marine aviation which has been turned over to General Partridge for operational control."[125] Further, the X Corps commander was "attempting to control, contrary to all written documents, the Air Force that supports him" and Gen Stratemeyer accused him of not being a "team player."[126]

Execution

Thomas Hone divides the air war over Korea into three phases. Phase one was the destruction of the NKAF from 25 June to 25 November 1950. The introduction of the MiG-15 and the massive Chinese ground intervention dominated phase II from 26 November 1950 to 9 July 1951. Lastly, the third phase starting from initial armistice negotiations on 10 July 1951 until the end of the war on 27 July 1953 was essentially a war of attrition between rapidly expanding Chinese MiG squadrons and the scarce Sabres and B-29s.

The destruction of the NKAF in phase I was a replay of WWII doctrine with air superiority being the primary goal of the 5th AF. After the initial assault from North Korean ground and air units, the F-80s and F-82s dominated local air engagements over South Korea. UN ground forces were being driven south to the Pusan perimeter, so US planners shifted focus away from air superiority to direct support of ground troops. A maximum effort was required by F-51 and F-80 ground attack fighters and the light B-26 and heavy B-29 bombers to avert North Korea pushing U.N. forces into the sea. During

[124] Crane, 28.
[125] George E. Stratemeyer, *The Three Wars of Lt. Gen. George E. Stratemeyer, His Korean War Diary*. Ed. William T. Y'Blood, (Washington DC.: U.S. Government Printing Office, 1999), 247.
[126] Stratemeyer, 247.

this phase, F-80s escorted the ground attack aircraft to the battle area and protected them from the NKAF. When the Pusan perimeter stabilized, Fifth Air Force was again able to focus on the air superiority role. Bomber Command's B-29s in conjunction with the F-80s and F-82s systematically destroyed the NKAF on the ground and in the air. The Yak-3, 7 and Il-10s were outclassed and their airfields lay in ruins. The NKAF was essentially destroyed by 7 October 1950 and the FEAF roamed the skies freely, with AAA constituting the only remaining threat.

The next phase of the air war revolved around Chinese intervention. Following the audacious amphibious landing by X Corps at Inchon on 15 September 1950 and the securing of their lines of communication, the NKPA resistance collapsed, resulting in a full retreat. In just over one month, the UN forces reached the Yalu River in the west. However, on 25 October 1950, the Chinese carried out their threat of intervention. With an estimated 180,000 troops, the Chinese crossed into North Korea, marching by night, and hiding from US reconnaissance assets by day.[127] The Chinese not only brought troops, but also a new jet that outclassed the F-80, the MiG-15. The MiGs operated from China, primarily from bases near Antung. They patrolled south over a triangle of land defined by the cities of Sinuiju, Chosan, and Chongju, called MiG Alley. With the introduction of Chinese MiG-15s, air superiority was no longer guaranteed over North Korea.

Gen Stratemeyer informed Gen Vandenberg, then Air Force Chief of Staff, about the appearance of the MiGs and their tactical advantage of operating from Manchuria, a political sanctuary. Although the MiGs did not have the range to seriously threaten UN forces below the 38th parallel, they could easily challenge air superiority over MiG alley

[127] Thompson and Nalty, 25.

and therefore restrict B-29, attack, and reconnaissance missions. Further, MacArthur informed the Joint Chiefs that saving the peninsula was in doubt as the Chinese counter attack rolled U.N. forces back. Based on MacArthur's report, Gen Vandenberg immediately agreed to send a wing of F-84s and the new F-86A by ship to bases in Korea and Japan.

The first F-86A Sabre mission occurred on 15 December 1950 and successfully engaged MiGs over North Korea. Unfortunately, the Communist forces were on the outskirts of Seoul and threatened UN forward bases at Suwon and Kimpo. Gen Partridge decided to withdraw the F-86As back to Japan, seriously limiting their reach and employment time. FEAF subsequently canceled B-29 day missions in MiG Alley for lack of fighter protection. Fortunately, neither MiGs nor bombers from the Communist forces aggressively pursued the retreating UN forces.[128] Reasons averred as to why the Chinese did not aggressively pursue UN forces were lack of long-range bombers, lack of drop tanks on MiG-15s, and fear of retaliation in their Manchurian sanctuary.[129]

Phase III of the air war began during the truce negotiations from 10 July 1951 until the armistice signing on 27 July 1953. In the face of a stalemate on the ground, offensive actions continued only in order to improve negotiating positions. The UN forces recovered bases in Korea and Fifth Air Force quickly improved them and moved more squadrons of F-86s to Korea. However, air superiority was hotly contested in MiG Alley.

The Chinese deployed increasing numbers of MiG-15s and other aircraft into the Manchurian bases. Already outnumbered 300 MiGs to 50 Sabres, the Chinese deployed 700 more by the summer of 1952. The Fifth Air Force responded with an additional two

[128] Hone, 466-67.
[129] Hone, 467.

wings of F-86s, now fielding the E and F models. Technological advances and tactics offset the remaining shortfall in numbers.

The Sabres went through upgrades attempting to match some of the strong points of the MiG. Engineers fielded the '6-3' wing on the F model and a retrofit kit for the E model. The kit removed the forward wing slat system (which allowed for lower maneuvering speeds) and replaced it with a solid leading edge thereby increasing high-speed performance, climb rate, and fuel capacity.[130] Combined with a new engine, the F-model edged faster, but gained fully 25 percent higher climb rate and high-altitude maneuverability.[131] Further, the Sabres received a radar range finder on their computing gun sight that allowed more efficient use of the guns. Engagements in the new jet age were so fast (at times nearly 1,000 knots of closure) that the pilots were not able to remain in a shooting position for more than a few seconds. One pilot remembers, "[t]he contrails were so heavy that when I pulled up to shoot, my canopy would enter his contrails. The radar gun sight was working marvelously and the first burst of a few seconds caused his aircraft to light up almost from wingtip to wingtip. It seemed that every round found its mark."[132] Still, pilots wanted the punch of a cannon with the rate of fire of machine guns.[133] Unfortunately, testing never yielded a practical mate of cannon and airframe.

Sabre pilots also used superior tactics to overcome the numerical advantages of the MiGs. The Sabre pilots noted that the MiGs could not all engage at the same time. The excess MiGs would hold high over the air battle and wait for a chance to engage. The

[130] Hone, 489.
[131] Maurice Allward, *F-86 Sabre*, (New York: Charles Scribner's Sons, 1978), 28-31, 125.
[132] Larry Davis, *MiG Alley, Air to Air Combat Over Korea*, (Carrollton Tx.: Squadron/Signal Publications, 1978), 52. Captain Harold Fischer, 15 February 1953, F-86F, ten victories.
[133] Davis, *MiG Alley*, 55. Also Hone, 488-89.

new higher-flying and maneuverable F-86F could finally engage the MiGs, removing their altitude sanctuary and foiling their attempts to support the other MiGs. Further, the MiGs were difficult to fly at very high speeds giving further advantage to the smooth F-86F chasing MiGs from their 40,000-foot perch. Additionally, a ground controlled intercept (GCI) station was moved north, to an island off the west coast, in order to give the Sabres intercept vectors to the MiGs, thereby saving fuel and acting as a force multiplier. An often overlooked advantage was superior maintenance. Although the Sabres were outnumbered, they were better maintained and consequently their sortie rate was greater than the MiG-15.[134] Further, Col James K. Johnson, commander of the 4th Fighter Wing stated, "performance of the MiG and Sabre were almost equals as long as the Sabres were well maintained."[135] Though Sabres fought an adversary with a political sanctuary, giving them a tactical advantage, the Sabres downed and damaged MiGs in increasing numbers. In June of 1953, 77 MiGs were shot down without a single F-86 loss.[136] The FEAF needed another way to counter the mismatch in numbers.

Figure 8 MiG-15 Fagot

Source: Davis, *MiG Alley*, 48.

[134] Hone, 491-92.
[135] Davis, *MiG Alley*, 60.
[136] Davis, *4th Fighter Wing*, 181.

Figure 9 F-86F Sabre

Source: Davis, *MiG Alley*, 48.

B-29s also assisted in the air superiority battle over MiG Alley by bombing forward MiG bases in accordance with WWII combat tested doctrine. Further, if they could drive the MiGs to Manchurian bases, then US ground forces would be relatively immune from air attack on the now stalled ground front. Freedom to attack, and freedom from air attack was achieved over the troops.

Escorting propeller driven bombers with jet fighters proved difficult. The speed differentials were too great to fly close escort. Further, close escort was proven a defective tactic during WWII. If the Sabres flew slowly next to the bombers, the MiGs could easily jump the entire formation with the Sabres unable to respond. Consequently, the Sabres had to sweep ahead of the B-29 formations. However, the large numbers of MiGs made it extremely difficult for the Sabres to fend off all of them. Once in firing range, the MiG's large 37mm cannon was deadly to the B-29s. Losses on day missions mounted. In October of 1951, five B-29s were shot down, four more damaged beyond

repair, and three lost to accidents. Eventually Gen Weyland rescheduled the missions to fly at night. [137]

Night bombing, however, was not much better than at the end of WWII. A radio navigation technique called SHORAN was used to guide the bombers. The North Koreans used early warning radar, radar guided searchlights, ground controlled intercept radar, and MiG fighter interceptors in conjunction with flak to foil attacks. The FEAF responded by fielding a night interceptor version of the F-80 called the F-94. However, the most effective countermeasures were a combination of target feints, close formation, electronic countermeasures, and chaff.[138] The B-29 raids kept enough pressure on the North Korean airfield building effort in MiG Alley, that by December of 1951, the North Koreans suspended their efforts.

The Korean War ended in a dissatisfying armistice, after two years of stalemate, under an umbrella of US air superiority. An "air pressure" strategy was adopted in the summer of 1952 to drive up the costs of the war to the communists by attacking new ground targets in North Korea.[139] Communist offensives periodically occurred in order to improve their position during negotiations—to no avail. On 27 July 1953, a cease-fire was signed and the fighting stopped.

[137] Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953.* (Lawrence Ks.: University Press of Kansas, 2000), 88-89.
[138] Hone, 484.
[139] Crane, 8.

Figure 10 The Few Against the Many

Source: Davis, *MiG Alley*

Analysis

The great air-to-air battles over MiG Alley occupy a special place in Air Force lore. The first all-jet engagements at over 1,000 knots closure speeds and 40,000 feet strained the men and machines on both sides of the border. Aces like Joseph McConnell, James Jabara, and Francis Gabreski were heroes, racking up kill ratios of 10-1 in a disappointing, nearly forgotten war. Aside from hero status, what did the guarantors of air superiority accomplish? Did their actions in MiG alley have any impact on the ground war that swayed rapidly north and south, and then ground to a virtual standstill for two years? Further, how do the air battles in MiG Alley illuminate the Air Force's view on air superiority today?

Air superiority is the "degree of dominance in the air…of one force over another which permits the [conduct] of operations…without prohibitive interference by the

opposing force."[140] Air superiority is not an end in and of itself, but an enabling condition for further air and surface action. It provides relative freedom to attack and freedom from attack. Further, air superiority can be localized in both time and space, covering only those areas needed for operations at specific times. A special case of air superiority, called air supremacy, occurs when an adversary is incapable of any effective resistance to air action.[141]

The FEAF gained and maintained air superiority, and in places, supremacy very early in the Korean War. With the conditions for exploitation of air attack secured, the FEAF pounded the Pusan perimeter in support of ground forces. The UNC's landing at Inchon and rapid advance to the Yalu was under the cover of an air superiority umbrella. Further, airpower delivered blows against North Korean war industries and supply lines that crippled the NKA.

There is no question that the FEAF had enormous impact on the ground war. Not only did FEAF retain responsibility for the defense of the Philippines and Japan, the Pacific theater in general was not as well equipped and funded as the European theater. Still, the FEAF dropped nearly 400,000 tons of bombs and fired over 300,000 rockets onto hostile forces and infrastructure. The FEAF claimed 976 aircraft, 1,327 tanks, 82,920 vehicles, 963 locomotives and over 10,000 railway cars, and tens of thousands of buildings, bridges, rail, bunkers and storage sites destroyed. Further, enemy killed claims were upwards of 180,000—equivalent to the Chinese invasion force. While FEAF aircraft losses were relatively high, 1,466, only 147 fell in air-to-air combat. Ground fire

[140] Air Force Doctrine Document (AFDD) 1-2, *Air Force Glossary*, 9 July 1999, 6.
[141] AFDD 2-1, *Air Warfare*, 22 January 2000, 29.

claimed the overwhelming majority of aircraft losses—816.[142] Whatever the exact numbers, the level of destruction by a relatively small force (112,000 at peak) on a larger force speaks to the efficiencies of airpower. However, a ground stalemate did occur, and airpower could not force the Chinese and North Koreans to quit the field. In April 1951, after MacArthur was relieved, President Truman and Lt Gen Matthew B. Ridgway reaffirmed the limited objectives of the Korean War. With extreme military costs on the Communists, and limited UNC objectives, breaking the stalemate with any forces may have been too optimistic since the prime animator of war—political will—was lacking.

Aside from political will, there was an important aspect of the Korean War that affected air superiority that has wider implications to airpower—sanctuary. A sanctuary is a place where an adversary is relatively immune from attack, and therefore can think, marshal, prepare, plan, and then launch operations. It is a place where the attacker cannot control tempo, or force the action. The North Koreans and Chinese were given sanctuary in Manchuria by political choice. In his fresh look at air warfare, Col John Warden describes different air superiority cases relating to the relative reach and vulnerability of opposing air forces. The best case is to hold the opposing force's bases vulnerable to air or ground attack, while maintaining a sanctuary for your own. Further, your forces must be able to reach the battle lines in order to exploit air warfare. The Korean War case exemplifies two of Warden's cases. Early in the war, the FEAF held North Korean bases at risk while the FEAF operated from relative sanctuary. Later, when the Chinese entered the conflict and used bases in Manchuria, both air forces were relatively immune from air attack since the FEAF was not allowed to attack targets in Manchuria. Warden asserts

[142] Futrell, *Korea,* 692.

that when both sides enjoy a sanctuary, a "long slogging match" ensues while the forces meet over the battle lines in pursuit of air superiority.[143]

Other notable sanctuaries exist, and airpower has long sought to defeat or push them back. David R. Mets writes of the bomber escort problems in WWII. The allies acquired longer range escort fighters, moving from Spitfires, to Thunderbolts, using drop tanks, and finally the combination of the P-51 Mustang and drop tanks. All the while the *Luftwaffe* traded airspace for the opportunity to attack the bombers unimpeded. When Mustangs appeared over Berlin with the bombers, "the last sanctuary had closed."[144] There are precious few places and targets that airpower cannot hit—but they are there. A cultural and moral sanctuary exists, as we do not have the will to risk damage to these symbols and innocents.[145]

Sanctuaries and political restraints thwart the efforts of doctrine to assemble, train, and employ forces in the most effective manner.[146] When this occurs, other factors must bridge the gap between the optimum use of forces described in doctrine, and what reality allows. One of the factors is technology. Although technology cannot bridge all gaps, it played a major role in MiG Alley. The more restricted the use of doctrine, the more valuable incremental improvements become.

In the end, MiG Alley highlights the military task of being prepared to meet an enemy in a disadvantageous position while the enemy having a sanctuary. The challenge

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[143] Col John A. Warden III, *The Air Campaign, Planning for Combat,*, (Washington DC.: Brassey's, 1989), 16-17.
[144] David R. Mets, "Stretching the Rubber Band: Smart Weapons for Ground Attack," in *Technology and the Air Force: A Retrospective Assessment*, ed. Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington DC.: Air Force History and Museums Program, 1997), 126-128.
[145] David R. Mets, *The Long Search for a Surgical Strike: Precision Munitions and the Revolution in Military Affairs* (Maxwell AFB, Al.: Air University Press, 2001), 47-48.
[146] There is no pejorative intent here regarding politically ceded sanctuary or political restraints. They are real, necessary, and inextricable from war.

was met with superior skill, tactics, and eventually, superior equipment. The prospect of fighting battles with restricted doctrine cannot be overlooked. Therefore every marginal advantage must be sought in all aspects of military art and technology to ensure victory in a variety of situations.

Chapter 5

Barrel Roll: Airpower in Counter-insurgency

By late 1964, when I succeeded Unger as ambassador to Laos, the mechanism for our "secret war" was largely in place. For the next four-and-a-half years, I directed that war, and in that period, gradually increased our operations in response to more aggressive North Vietnamese intervention.

—Ambassador William H. Sullivan

Introduction

Laos was integral to U.S. Communist containment strategy in Indochina since the early 1950s. Not wanting to risk outright confrontation with the Soviets, the U.S. took measured steps in different parts of Indochina. With only a handful of resources, and straight-jacket rules of engagement, the U.S. supported a counter-insurgency against the Communist Pathet Lao and North Vietnamese Army (NVA) that achieved many political and military goals in Laos. Called Operation BARREL ROLL, the air campaign in Northern Laos both aided the Royal Laotian Government (RLG) by blunting Pathet Lao and NVA attacks and attrited supplies moving down the Ho Chi Minh Trail bound for South Vietnam.

While the US military failures in Southeast Asia spurred many warfighting improvements, did the relative success of a small, limited, secret, counter-insurgency

campaign have similar positive effects? Did the USAF improve its Military Operations Other Than War (MOOTW) capabilities based on its experience in Southeast Asia?[147]

Situation

The "secret" war in Laos involved many different forces, governments, and objectives in a conflict where all sides had an interest in keeping the war limited and covert. Yet access to, and control of, Laos was critical to the strategies of all sides and therefore Laos could not be ignored. The NVA needed Laos as an infiltration route into South Vietnam, and the Pathet Lao forces sought political control of Laos. Similarly, the small Royal Laotian Army (RLA) along with a guerilla army of CIA funded Hmong tribesman and Thai mercenaries attempted to protect its government from Communist influence.[148] The U.S. saw Laos as another political "domino" to be protected from advancing Communism, and a vital military flank to South Vietnam, Cambodia, and Thailand. Because of the high stakes involved for all sides, "neutral" Laos became a covert battleground.

US intervention in Southeast Asia was the result of a consistent strategy of containment. Simply stated, the objectives of five US administrations were to "get North Vietnam to allow South Vietnam, Laos, and Cambodia to determine their own futures."[149] However, following the 1954 Geneva agreement ending hostilities in Indochina, the situation on the ground was anything but conducive to regional self-

[147] Military Operations Other Than War (MOOTW) are "those military activities not associated with sustained, large scale combat operations." See Air Force Doctrine Document (AFDD) 2-3, *Military Operations Other Than War*, 3 July 2000, 1.
[148] Edwin E. Moise, *Historical Dictionary of the Vietnam War*, (Lanham Md.: The Scarecrow Press, Inc., 2001), 226-228.
[149] Quoted in Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1961-1984*, vol. 2, (Maxwell AFB, Al.: Air University Press, 1989), 255.

determination. Pathet Lao forces occupied northern portions of Laos and largely refused International Control Commission monitoring of the Geneva agreements. Further, North Vietnamese advisors remained in Laos, training and equipping the Pathet Lao. Civil war gripped the country intermittently, while the NVA used Laos as an infiltration route and sanctuary to South Vietnam. The weak Laotian government was vulnerable to Communist pressure.

Fearing Communist takeover of the region, the U.S. initiated diplomatic and economic programs to recapture the political momentum in Southeast Asia. The U.S. assembled and signed the Southeast Asian Treaty Organization (SEATO) agreement in 1954 obligating the U.S. to support its allies in the region in the event of external aggression.[150] Also, the U.S. established a diplomatic mission in the Laotian capital, Vientiane, and began economic assistance to bolster the RLG.[151] The Communist insurgency exerted unrelenting pressure, and the U.S. soon found itself wanting a firmer stand. However, the 1954 Geneva agreement forbade the introduction of foreign forces into Laos—an agreement the U.S. wanted to honor. Further, Laos itself was not allowed to enter into any military alliances.[152] Faced with national interests of preventing "dominos" from falling to Communism, yet desiring to appear to comply with international agreements, the U.S. began covert military operations inside Laos.

In 1961, the Kennedy administration stepped up support to the RLG and set a course for increased involvement in Southeast Asia. He ordered the transfer of Marine

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[150] Jacob Van Staaveren, *Interdiction in Southern Laos, 1960-1968: The United States Air Force in Southeast Asia*, (Washington DC.: Center For Air Force History, 1993), 1-2. SEATO signatories were Australia, New Zealand, Great Britain, Pakistan, Philippines, Thailand, and United States. Although Laos was forbidden to enter military alliances, SEATO named Laos as a country it would protect.

[151] Van Staaveren, *Interdiction*, 2-4.

[152] "Indochina-Final Declaration of the Geneva Conference on the Problem of Restoring Peace in Indo-China, July 21, 1954 (1)," The Avalon Project at Yale Law School, 23 March 2003, available on-line, Internet, www.yale.edu/law/avalon/intdip/indoch/005.htm

helicopters to the CIA-funded Air America based in Udorn, Thailand, as well as positioned ground advisors in RLA units.[153] By 1963, Air Force personnel were training Thai and RLAF pilots in the T-28 attack aircraft in Thailand. At the height of operations, the RLAF had 100 attack aircraft, mainly T-28s, T-6s and AC-47s.[154] The CIA recruited a ground force from Hmong tribes in the north that were more aggressive than the RLA. Their numbers ebbed and flowed, but by 1969 they numbered about 40,000.[155]

US forces committed to BARREL ROLL varied throughout the years of the campaign, but included a wide variety of attack and reconnaissance aircraft. The Air Force primarily used the A-1 Skyraider, F-105 Thunderchief, F-100 Super Sabre, B-57 Night Intruder and later the F-4 Phantom and F-111 Aardvark as attack aircraft. B-52s were eventually employed on ARC LIGHT missions. Gunships used were the AC-47, AC-119 and the AC-130. Forward air control aircraft provided close observation of the battlefield utilizing the O-1, O-2, U-17, T-28 and OV-10 aircraft.[156] Other support aircraft included the C-123 as a "flare ship" to illuminate night targets as well as KC-135 refueling support. One of the most important aspects of the BARREL ROLL campaign was reconnaissance. For this mission, the USAF used the U-2 Dragon Lady for wide area mapping, and the RF-101 Voodoo for specific targeting.[157] The RLAF also operated 50 transports and helicopters.

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[153] Air America was a CIA funded contract air cargo airline operating in Laos in support of covert operations.
[154] Perry L. Lamy, *BARREL ROLL, 1968-73, An Air Campaign in Support of National Policy*, (Maxwell AFB, Al.: Air University Press, 1996), 23.
[155] William H. Sullivan, *Obbligato 1939-1979, Notes on a Foreign Service Career*, (New York: W. W. Norton & Company, 1984), 211.
[156] Lamy, 23.
[157] Van Staaveren, *Interdiction* 22, 48-50.

Mission

In 1961, President John F. Kennedy tasked the US mission in Laos (ambassador and staff) to direct diplomatic and covert military operations to support the RLG.[158] The same direction carried over to subsequent administrations and ambassadors. The military mission of BARREL ROLL provided direct air support for RLA and guerrilla forces fighting the Pathet Lao and NVA, and interdiction of enemy supplies moving through Laos.[159]

The US Ambassador to Laos, William H. Sullivan, described the political goal of operations in Southeast Asia as a withdrawal of North Vietnamese forces back to their own borders via a military and diplomatic defeat in South Vietnam.[160] The risk of overt intervention from China, Soviet Union, and North Vietnam demanded mission secrecy. Indigenous forces, with support from CIA operations, and airpower based outside of Laos, did most of the fighting.

The North Vietnamese also had a similar political objective of keeping a low profile in Laos. They feared overt US intervention as it detracted from their goal of uniting Vietnam under the Hanoi regime. Further, since they had been able to ignore two agreements to vacate Laos of combat troops, they calculated that the threat of large interventions by the U.S., Soviet Union, and China would lead to more firm enforcement of the 1954 Geneva agreements.

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[158] Timothy N. Castle, *At War in the Shadow of Vietnam: US Military Aid to the Royal Lao Government, 1955-1975*, (New York: Colombia University Press, 1993), 54. See discussion on the "Kennedy Letter." Its authority excluded military members under the command of another military commander. However, military members were directly assigned to the US mission at times.

[159] Lamy, ix.

[160] Sullivan, 209-210. Also, other relevant ambassadors during this era were Winthrop G. Brown (1960-1962), Leonard S. Unger (1962-1964), William H. Sullivan (1964-1969), and G. McMurtrie Godley II (1969-1973). Department of State, "Chiefs of Missions," n.p., on-line, Internet, 29 March 2003, available from http://www.state.gov/r/pa/ho/po/com/10902.htm.

Administration and Logistics

Administration for the air effort in Laos was primarily provided through two channels, normal Air Force channels, and covert channels. The USAF administrative chain of command began at Thirteenth Air Force in the Philippines and terminated at the base of assignment depending on the unit. Seventh Air Force maintained operational control over combat assets, assigning combat missions. The second administrative channel was the US diplomatic mission in Vientiane, responsible for covert operations in Laos. Only about 200 military personnel operated in Laos at any given time.[161] Most Air Force personnel in Laos were "Ravens," a nickname for the forward air controllers (FAC). They were assigned to Udorn Air Base, Thailand, but served six-month temporary duty assignments at one of the five air operations centers in Laos. They dressed in civilian clothes, carried civilian identification credentials and flew largely RLAF aircraft like the O-1, U-17, and T-28.[162]

Due to poor roads, mountainous terrain and a rainy season that further deteriorated roads, air support was critical to operations and logistics throughout Laos. Called "Lima Sites," the CIA funded 200 small airfields in remote locations for logistic support and operating bases for Laotian forces. Air America, a civilian contract airline funded and operated by the CIA, flew cargo and support missions inside of Laos using the Lima sites. Most of their cargo and passenger traffic was overt, but they also flew guerrilla forces, ammunition, food, and other logistical necessities for the covert air and ground effort.[163]

[161] Lamy, 23. Also see Sullivan, 211.
[162] Castle, 86-87.
[163] Lamy, 28.

Command and Control

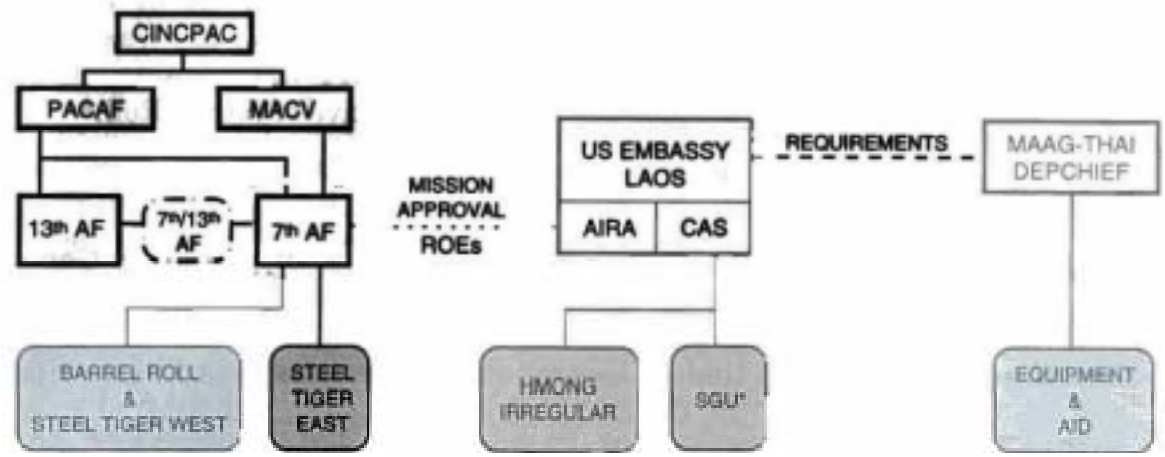

Figure 11 Command and Control Relationships

Source: Lamy

The nature of the command and control structure reflected the desire to keep the operations covert, yet take advantage of regular Air Force assets operating in Thailand and South Vietnam. By Presidential order, the US Ambassador in Vientiane had overall direction of the effort. Control extended down to the tactical level as "[t]he ambassador employed a well-defined set of rules of engagement (ROE) to restrict the employment of US tactical air. Each area of operation had different rules. In addition, he established free-strike zones, restricted areas, and special operating areas to provide more flexibility for the employment of tactical air."[164] The air attaché (AIRA) advised the ambassador on military issues while the CIA operated as the controlled American source (CAS).[165] The CIA worked directly with Maj Gen Vang Pao's Hmong forces and a special guerrilla unit (SGU). They determined air support required and either directly tasked RLAF, Air

[164] Lamy, 28.
[165] See figure 1. CAS in the diagram refers to the controlled American source, or CIA. For the purposes of this paper, "CIA" is substituted for the "controlled American source" and "CAS" is close air support.

America, or Raven units. The embassy exchanged logistical requirements with the military assistance group (MAAG) in Thailand.

The US embassy injected requirements into regular Air Force channels via headquarters Seventh/Thirteenth Air Force at Udorn, complete with ROE set by the ambassador. From Udorn, Seventh Air Force tasked regular Air Force missions. The Commander-in-Chief, Pacific Command (CINCPAC) retained combatant command over Seventh Air Force assets while his air component commander maintained operational control. The Commander, US Military Assistance Command, Vietnam (COMMACV) and the air component deputy maintained the physical command and control network with Seventh Air Force resources.[166]

COMMACV also had an operational mission based on CINCPAC's strategic guidance using all service components. The inevitable conflict of mission requirements and limited resources led to a priority system of air missions. Operations like ROLLING THUNDER in Vietnam took top priority, the STEEL TIGER interdiction campaign in southern Laos was next, followed by BARREL ROLL in northern Laos.

Based from five air operations centers, airborne "Ravens" exercised tactical control of the BARREL ROLL area. The Ravens reported to the air attaché at the embassy and controlled air strikes in the BARREL ROLL area, depending on support required for the land campaign.[167]

In the BARREL ROLL area in northern Laos, the embassy faced a lower mission priority than ROLLING THUNDER and had to request assets and support. Similarly, if COMMACV wanted to operate in the STEEL TIGER area, the embassy had approval

[166] Lt Col Harry D. Blout, *Air Operations in Northern Laos, 1 Apr-1Nov 70*, Project CHECO (Hickam AFB Hi.: Headquarters Pacific Air Forces, 15 Jan 1971), 3.
[167] Lamy, 28-29.

authority on all missions and ROE. The air attaché in Vientiane was subordinate in rank to the generals at Seventh and Thirteenth Air Force as well as COMMACV, but exercised all military approval authority in Laos. Consequently, the relationship with the embassy "galled" senior US commanders since they were supporting a junior officer.[168] COMMACV illustrated the problem saying, "USAF FACs were flying secretly from Laos, under control of the air attaché for a [Laotian] ground commander advised by the CIA, to direct strikes by USAF planes based in Thailand under control of a command center in Vietnam."[169]

[168] Castle, 88-89.
[169] Blout, 5.

Figure 12 Air Operations Areas in Laos

Source: Adapted from Van Staaveren, *Interdiction*.

Execution

The first BARREL ROLL mission began on 14 December 1964. A strike package of F-105s, F-100s, and RF-101s flew strike, escort, and reconnaissance respectively.[170] The target was a bridge in the Nape Pass region of the northern Laotian panhandle. They missed. The Navy launched a similar unsuccessful strike three days later that may have caused civilian casualties. Ambassador Sullivan was disappointed with initial results. After six BARREL ROLL missions, embassy and military officials concluded that BARREL ROLL was not accomplishing its military objectives. However, there were no official complaints from Hanoi, Peking, or Moscow about direct US attacks. Further, the attacks seemed to improve the morale of the Laotians.[171] Therefore, like many of the operations in Southeast Asia, less than satisfactory results inspired expansion of operations.[172]

Strike packages increased in size and frequency, but so too the mistakes and aircraft losses. Each misplaced bomb or aircraft loss put pressure on the embassy in Vientiane as they waited for the world to uncover the operations. Fearing discovery, the embassy further restricted targeting, aircraft, and weapons just as the military services were asking for expansion of operations.[173] Vientiane acquiesced and soon night attacks were approved using the B-57 and fighter-bombers in conjunction with flare ships illuminating

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[170] Jacob Van Staaveren, *Gradual Failure, The Air War Over North Vietnam, 1965-1966,* (Washington DC.: Air Force History and Museums Program, 2002), 64.
[171] Van Staaveren, *Interdiction,* 46-47. Also, Van Staaveren in *Gradual Failure* states that Hanoi complained to the International Control Commission about RLAF attacks, and US sponsored attacks, but not US attacks in Northern Laos. To do so may illicit a required response from Moscow or Peking.
[172] FLAMING DART reprisal missions and FARM GATE failed to stem attacks on US forces in South Vietnam.
[173] Van Staaveren, *Interdiction,* 49.

the jungle trails. However, the greatest impetus for expansion occurred as a result of actions in South Vietnam.

On 7 February 1965, Viet Cong guerillas attacked US forces in Pleiku, South Vietnam killing 8, wounding 104, and destroying numerous aircraft.[174] Similar incidents softened political opposition to widening the war. Consequently, the U.S. conducted reprisals in North Vietnam called FLAMING DART and shortly thereafter began the ROLLING THUNDER air campaign.

US commanders pressed for a maximum counter-infiltration effort to stem the tide of Viet Cong supplies arriving in South Vietnam. They divided the BARREL ROLL area into three areas comprised of BARREL ROLL in the north, STEEL TIGER in the south and eventually TIGER HOUND in the southeast (Figure 2).[175] The southern areas closest to South Vietnam were primarily interdiction areas, whereas BARREL ROLL in the north combined interdiction with direct support of Laotian ground troops.

While the influx of aircraft for ROLLING THUNDER gave Ambassador Sullivan more capability, it also exposed the prioritization problems between the embassy and COMMACV. Sullivan wanted faster response to support ground forces that located a target or were in enemy contact. However, COMMACV gave priority to ROLLING THUNDER missions. Further, the politics controlling ROLLING THUNDER tended to overshadow Sullivan's objectives. The bombing halt in December of 1965 took Air Force sorties from Sullivan until he successfully lobbied to restart BARREL ROLL.[176]

Soon, a pattern developed in Laos that closely matched the seasons. During the dry season (November-May), when the roads were passable, the NVA would increase their

[174] Van Staaveren, *Interdiction,* 50.
[175] Van Staaveren, *Interdiction* 57.
[176] Van Staaveren, *Interdiction,* 102-103.

use of the Ho Chi Minh Trail. Similarly, the Pathet Lao could maneuver its tanks and artillery for advances on RLG positions in the Plain of Jars and directly threaten Vientaine. Since the RLG were out-numbered and out-gunned the Pathet Lao usually made good progress during these periods.

During the wet season, when roads were harder to move on, the opposite was true. Although the weather was a constant impediment, air power took advantage of slow trucks, tanks, and artillery with direct attack missions. Further, because Pao's forces were light infantry, airpower gave them superior operational mobility and logistics support. The Pathet Lao and NVA had no similar capability.[177]

In the 1969 wet season, Pao managed to push the NVA and Pathet Lao out of the Plain of Jars, all the way to the North Vietnamese border. Called Operation "About Face," Pao used upwards of 200 attack, reconnaissance, and airlift sorties per day for two weeks.[178] The Ravens even directed artillery, especially during bad weather.[179] The assault captured the Pathet Lao provincial capitol and huge store of weapons, ammunition, and fuel.[180]

The next dry season, however, brought the same frustrating defensive that always proved problematic. Airpower could attack and inflict large losses only if the enemy massed. Pao's forces would have to stand and fight in order to mass the enemy. However, Pao had so few men, 3,000 to 6,000, that he could not afford losses inevitable

[177] Castle, 80.
[178] Blout, 1.
[179] Blout, 13.
[180] Castle, 106.

in that tactic.[181] He therefore chose to withdraw to strong points taking advantage of time and space.

By 1970, the war in Southeast Asia had changed. The 1968 Tet offensive by the Viet Cong had prompted "Vietnamization" of the war and started a general withdrawal of US forces. Consequently, the numbers of aircraft available to support BARREL ROLL decreased. Further, by 1971 the Hmong population was tired of war and did not supply guerrilla troops in the quantities required to maintain a strong force. Thai mercenaries could only fill some of the gaps.[182] Airpower would have to make up the rest.

As sortie allocation diminished during the general withdrawal of US forces, the effectiveness of the sorties needed to rise in order to compensate. One significant contribution was the "hunter-killer" combination of the Udorn-based USAF AC-119s and Army OV-1 Mohawk. The OV-1 was equipped with a side-looking radar (SLAR) or an infrared heat detector and scoured the jungle for targets. When located, they would call in the loitering AC-119 for the kill. The hunter-killer team more than doubled the truck kill rate achieved by that gunship working alone.[183] However, sortie priorities in other parts of the theater, and the fact that only one SLAR-equipped OV-1 was available hampered operations.[184]

The slow target coordination process frustrated the military and embassy leadership. Typically, targeting approval from the ambassador and strike scheduling at Seventh/Thirteenth Air Force took five days. Further, airborne diverts for emerging

[181] Blout, 9.
[182] Castle, 111.
[183] Blout, 18-19.
[184] Blout, 20.

targets in Laos slowed, as there were fewer sorties airborne in the theater.[185] The problem was addressed through a Quick Reaction Force (QRF).[186]

In May 1970, a QRF force of F-4s was established at Udorn Air Base, Thailand. The aircraft carried a variety of ordnance to handle both soft and hard targets, as well as different weapons delivery profiles. Requests for support could come from Ravens or Pao's ground force forward air guides. Typically, a Raven might spot a target and pass the information to a C-130 airborne command post (ABCCC). The ABCCC would then relay the information to the command post at Seventh Air Force where the decision to launch the QRF was made. Seventh then ordered Udorn to launch the alert flight and passed relevant QRF information forward to the ABCCC and on-scene Raven. The QRF crew could be airborne in about 25 minutes, and be anywhere in Laos in about one hour.

There were some disadvantages of the QRF. Sorties were lost if there were no targets that day and sub-optimal bomb loads reduced some attack effectiveness.[187] A typical complaint of Laotian ground forces was the poor bombing accuracy from "fast-movers." Seventh/Thirteenth Air Force finally approved the delivery of Snakeye high-drag bombs from low altitude (under 1,000 feet), which had its desired effect. Although the risks were higher, no F-4s were lost over Laos due to this technique.[188]

Other methods of keeping the pressure on the Pathet Lao and NVA were developed. SKYSPOT was a ground based radar weapons delivery aid that gave pilots an indication when to drop their weapons based on their position, altitude, speed, and vertical velocity. This radar system gave nearly all attack aircraft at least some all-weather capability.

[185] Blout, 20-21.
[186] Lamy, 27.
[187] Blout, 22-24.
[188] Blout, 24.

Pilots did not like using it however, because of long bomb runs, problems with equipment causing aborted runs and the inability to verify hits. The F-111 was also introduced in 1972 as an all-weather strike aircraft in Laos. The embassy in Laos favored the all-weather techniques due to the ability to remove the weather and night sanctuaries and keep pressure on the Pathet Lao.[189]

As US funding and political commitment for anti-Communist forces decreased throughout Southeast Asia, a decrease in military activity and an eventual cease-fire between the Pathet Lao and the RLG occurred in early 1973. The Pathet Lao and NVA still controlled two-thirds of Laos, but made no gains from the 1961 cease-fire lines.[190] A new coalition government formed in the Spring of 1974, but by the winter of 1975 the Pathet Lao staged a bloodless coup and declared a Communist Lao People's Democratic Republic.[191]

Analysis

The stinging defeat in Vietnam provoked deep thought and innovation in all services.[192] The reason for this service innovation, however, was the Soviet Union, still the dominant threat of the time. But hiding in the shadow of Vietnam, was a small but significant success story that did not fit the Air Force's vision of progress.

Air support in a counter-insurgency offered a clear success in Laos. Effective use of a small, relatively low-tech, low-performance air force, enabled the Hmong guerillas to keep the vastly superior NVA and NVA backed Pathet Lao from achieving their political

[189] Blout,26-29.
[190] Lamy, 33.
[191] Moise, 227.
[192] Prime examples of military service introspection are the Fighter Weapons Schools of the Navy and Air Force, and the Army's AirLand Battle Doctrine.

goals in Laos for over a decade. How did the success of counter-insurgency operations find its way into Air Force thinking? Where should counter-insurgencies fall in the priorities of Air Force missions?

Following the Vietnam War, the Air Force had a mixed reaction to "those kinds of wars." Dennis Drew, in an article on airpower and insurgencies, states that there was keen interest during the Vietnam War on insurgencies (MOOTW), yet by the 1970s, interest had waned. Drew contends that "[t]he seriously mixed feelings about the dénouement of the US combat involvement in Vietnam, the unfortunate final outcome of the struggle in 1975…[and] the perceived need to refocus on the Soviet threat…combined to limit debate and research about airpower in protracted revolutionary warfare."[193] The Air Force did produce doctrine dealing with insurgencies in 1967, but four iterations of doctrine from 1971 to 1984 reflected a steady decline in thinking.[194]

There is a rebound in doctrine and organization however. The Air Force now has three doctrine manuals specifically dealing with aspects of MOOTW. They are *AFDD 2-3 Military Operations Other Than War, AFDD 2-3.1 Foreign Internal Defense,* and *AFDD 2.7 Special Operations.* Along with the stand-up of US Special Operations Command in 1987 as a Joint Command, Airmen have re-learned the special requirements of "those kinds of wars."

How the Air Force prepares for future conflict is one of the most basic, yet essential questions surrounding combat readiness. There are at least two competing theories that could lead to very different doctrines and force structures. The first is preparing for the

[193] Dennis M. Drew, "U.S. Airpower Theory and the Insurgent Challenge: A Short Journey to Confusion," *The Journal of Military History* 62 (October 1998), 820, and passim.
[194] Air Force Manual (AFM) 1-1 *United States Air Force Basic Doctrine* published in 1971, 1975, 1979, and 1984 relegated counterinsurgency to "two generalized subparagraphs (one pertaining to special operations, the other to sub-theater and localized conflicts)." See Drew, 823.

"most likely" scenario. The second in the "most dangerous." Globally, the most common form of war is the insurgency. However, the most dangerous is general war, involving nuclear weapons, against a powerful state. Which should the Air Force prepare for?

An argument can be made that if the Air Force prepares for the most dangerous case, general war, then those forces, organizations, and doctrine will be sufficient for lesser contingencies. This line of reasoning assumes that the scale of the conflict is the most important discriminator between the two types of wars. However, the very nature of the conflict is the problem in insurgencies—not the scale.

The nature of an insurgency is the battle for popular support of the indigenous population—the center of gravity. Drew rightly points out that the center of gravity for both antagonists is the same population. Therefore, attempting to root out insurgents from among a population with a very "kinetic" Air Force becomes problematic. Collateral damage constitutes the quintessential mistake of counter-insurgency warfare.

Although mainstream USAF fighter and bomber weapons systems were used to great effect in Laos, arguably the most effective weapons systems were all propeller-driven. The hunter-killer teams of Ravens flying the O-1 and attack aircraft like the T-28 and AC-130, had the loiter time and accuracy required for ground force support. Further, Air America's fleet of small fixed and rotary wing support aircraft were indispensable in the mountains and jungle.

Unfortunately, the opposite approach to preparedness may carry too much risk. Although historically less likely, facing a dominant military force in general, unlimited war may prove to be catastrophic. Similarly, a nation may be able to "lose" several

smaller conflicts and still be able to function normally. Further, preparing for general war may itself be a deterrent to would be aggressors, and therefore partially explain the relative infrequency of large wars. Consequently, the advantages of preparing for a large war seem to outweigh the costs. But does this imply the Air Force is doomed to be unprepared for the most likely scenarios?

BARREL ROLL is instructive on three important points regarding MOOTW and the "Big Blue" Air Force. First, the political nature of the conflict in Laos was acknowledged. The missions flowed from the embassy based on the ground situation and political climate in an effort to unify political and military objectives. Second, a small cadre of experts was trained to coordinate closely with ground forces and political entities. These experts were able to build trust between supporting airpower and ground troops enabling elements of synergy. Lastly, those highly trained experts integrated large Air Force forces into the conflict where required. This allowed "reserve" firepower without the political penalties of fielding a large force in country.

The transition to today's Air Force is robust Special Operations Forces (SOF). Their ability to directly fulfill a host of special missions outlined in their doctrine is key to both military and political success. Further, the ability of SOF to successfully integrate larger Air Force forces into specific circumstances brings tremendous capability to bear. Taking advantage of strategic and theater reconnaissance and airlift assets not normally associated with SOF forces could greatly enhance their capability. The future success of the "most likely" cases facing the USAF depends on how well the Air Force can train Special Forces and prepare more conventional Air Force assets for missions in an insurgency environment.

Chapter 6

Conclusion

> *From these [histories] the student can discover, not only the sequence of past events, but their tendencies, and, above all, the probable direction of these tendencies in the future.*
>
> —Colonel J. F. C. Fuller, 1926

The preceding four case studies in the employment of airpower were disparate in airpower function, era, and military outcome. This construct yielded a wide survey of airpower in relatively few case studies. Interestingly, meaningful continuities can still be drawn between the cases. Continuities suggest that there may be some immutable principles in the nature of airpower that can be identified in other case studies, and future operations. The case studies reveal airpower's flexibility, its close ties with politics, its ability to overcome barriers, and its "strategic blind spot" of ground defenses.

Flexibility is defined by Air Force doctrine as the ability to exploit mass and maneuver in order to easily shift from one campaign objective to another, quickly and decisively.[195] The Ploesti raid exhibited at least two forms of flexibility. The first was tactical flexibility. Heavy bombers were used in mass formation at minimum altitude in order to destroy pin-point targets in one attack. This was in contrast to its high altitude bombardment strategy extensively used over Europe. Operationally, the attack on Ploesti occurred during the HUSKY operation in Italy. Airpower supported the ground scheme of maneuver one day, and attempted destruction on strategic targets the next.

[195] Air Force Doctrine Document 1, *Air Force Basic Doctrine,* September 1997, 23-24.

During the Berlin Airlift, the Air Force demonstrated flexibility when it was able to assemble a large number of airlift aircraft from all over the world, and place them in a system of systems to maximize the performance of one particular task. The Air Force used Military Air Transport System aircraft and crews, and troop carrier aircraft and crews alike. Even more flexibility was shown by the British because of the limited number of airlift aircraft in use. They used numerous types of converted bombers to carry the cargo. General Curtis LeMay, early in the airlift, even suggested B-29s perform low-altitude "bombing" with coal near Tempelhof.[196] The concept was soon abandoned, however, probably due to the influx of numerous C-54s.

The air superiority campaign during the Korean War showed flexibility. Although the primary method of achieving air superiority over MiG Alley was the F-80, then F-86, the B-29 played an integral role by bombing airfields and forcing MiG bases across the Yalu River into their political sanctuary. With air superiority won, models of the F-86 were converted to the ground attack role. General Otto P. Weyland praised the F-86F fighter-bomber "because of its versatility in accomplishing the three phases of the tactical air-force mission: …air superiority, interdiction, and close air support." After four months of operations, Fifth Air Force described the F-86F as the "most suitable fighter-bomber employed in Korea," due to its ability to survive, stable bombing platform and payload.[197]

During BARREL ROLL, T-28s were the primary attack aircraft, however Ravens frequently called on excess sorties from the Vietnam bombing campaigns and used

[196] Roger G. Miller, *To Save a City, The Berlin Airlift, 1948-1949,* (Washington DC: Government Printing Office, 1998), 32.
[197] Robert F. Futrell, *The United States Air Force in Korea, 1950-1953,* (Washington DC: Office of Air Force History, 1983), 639.

airborne diverts from a wide variety of platforms including airlift aircraft converted into airborne gunships.

Today, flexibility is clearly manifest in the way time-sensitive targeting is conducted. Aircraft are now able to takeoff, hold on station until targets emerge, and engage with speed and precision. With the aid of stand-off munitions, force application may occur over a wider range of targets, supporting a wider range of military objectives than ever before possible. Airpower is likely to be increasingly flexible and called on to fulfill multiple roles using the same platform as munitions, targeting, and command and control improve.

Another continuity among the four cases is airpower's close relationship to politics. To say that airpower, like war, serves a political master is not particularly enlightening, though it does serve to counter simplistic attempts to characterize airpower as "airborne artillery."

Political considerations affected the use of airpower in the Ploesti raid. USAAF leadership supported the raid because it was an independent, strategic mission—just the type needed to prove the value of the USAAF as a separate service. Further, the political considerations of aiding the Russians against the Germans outweighed the operational considerations of additional support of the invasion of Italy.

The Berlin Airlift provided an effective non-lethal military instrument that helped prevent ignition of the nascent Cold War. Airpower was used in combination with a rather porous Berlin border and an effective counter-blockade to give politicians time to work the details of a settlement. In this case, airpower offered the most palatable demonstration of military power and resolve. Other options included running the

blockade, or using B-29s more aggressively than simple deployment to Britain, both which have the danger of escalation.

During the Korean War, the political sanctuary in China created serious, yet justifiable limitations to the pursuit of air superiority. Having won air superiority early in the war, airpower's apparent affect on the surface battle was nearly completely dependent on the political environment. When UN forces were politically free to push toward the Chinese border, airpower played a major role in the rapid advance, and thwarting the Chinese counteroffensive. However, when UN forces were politically restricted to operations near the 38th parallel, the bombing of North Korean and Chinese forces, while inflicting severe damage, could not appreciably move the battle lines. While air superiority ensured UN ground forces freedom from air attack, it did not guarantee these forces offensive freedom to attack.

During BARREL ROLL, the secret, covert nature of the air war was completely dominated by political considerations. It was literally run from the ambassador's office. The relatively small, measured application of airpower was successful in keeping a small army in the field, thereby bolstering the Laotian government. When political support for the BARREL ROLL and the counter-insurgency was removed, the small Laotian army quickly collapsed, and so too the Laotian government.

More recently, during Operation ALLIED FORCE in 1999, decision makers thought airpower the only politically acceptable military force considered for use in Yugoslavia. The political price of entry for ground forces was deemed too high, regardless of the advantages of combined arms strategy. Airpower, both lethal and non-lethal, is likely to become increasingly able to satisfy political objectives in politically restrictive and

permissive environments. Increasing capabilities in surveillance and reconnaissance, precision munitions, collateral damage mitigation, speed of response, and range are all political enablers to the use of force.

Another continuity common to all four cases is the rolling back of sanctuaries. Airpower is asked to circumvent, overfly, or technologically defeat significant enemy sanctuaries that otherwise could not be overcome by ground or naval forces. The Ploesti raid saw the sanctuary of distance, time, and terrain overcome. For centuries land and naval forces have taken advantage of these factors to preserve and employ forces. However, the Ploesti raid demonstrated that distance, mountains, water, and time were no longer adequate defenses. The Berlin Airlift overcame the same distance, time, and terrain sanctuary evident in the Ploesti raid, but on a smaller absolute scale. The challenge in the airlift was one of repetition and efficiency, not overcoming physical sanctuary per se. Further, air corridors were the only way to enter the friendly sanctuary.

The Chinese MiGs had a clear political sanctuary when they operated from Manchuria. They were free to operate from, and run back to their bases while the F-86s and B-29s could have easily engaged them there, resulting in set-piece air engagements over MiG Alley. Superior tactics, training, and incremental improvements in aircraft performance eventually won air superiority.

The BARREL ROLL campaign only partially overcame two related sanctuaries, night and poor weather. Long the bane of airpower, night and poor weather inhibit the intelligence, targeting, engagement, and assessment cycles of airpower. The Pathet Lao and NVA specifically took advantage of night and poor weather to conduct operations. Attempts to push back these sanctuaries included low, slow flying O-1 and U-17

observation aircraft, embedded ground liaisons, and extensive training and knowledge of surrounding terrain by observation and attack pilots. Each of these options had inherent risks and only partially addressed the problem. Later, side-looking radar sensors on gunships proved invaluable for targeting enemy forces during night and poor weather.

Airpower has steadily pushed back the weather and night sanctuaries to the point where the advantage lies with the air attacker. The combination of night vision equipment and laser weapons greatly facilitated night bombing. Global Positioning Satellite-aided weapons have finally provided a highly accurate substitute for radar bombing in poor weather. In contrast, enemy movement and ground defenses are less effective at night and in poor weather giving more advantage to airpower.

Another continuity that runs through the four cases is the profound effect of ground defenses on airpower. Somewhat dismissed by early theorist and advocates of strategic bombing, ground defenses have proven formidable since the famed German flak batteries in WWII. Not only did German flak account for 5,400 aircraft shot down over Europe (more than by fighter attacks), flak also accounted for the overwhelming amount of damage to bombers, turned back sorties, disrupted bombing runs, and inaccurate bombing from higher altitudes.[198]

The ground defenses at Ploesti exacted devastating losses. Called the "graveyard of bombers," that one target accounted for nearly 10 percent of all Fifteenth Air Force losses due to flak.[199] Still, a large part of the calculus for attacking Ploesti from low altitude was fear of the *Luftwaffe's* fighters.

[198] Edward B. Westermann, *Flak: German Anti-aircraft Defenses 1914-1945,* (Lawrence, KS: University Press of Kansas, 2001), 286, 288-292.
[199] Westermann, 286-287.

Although the Berlin Airlift was an example of a non-lethal use of airpower and not subject to ground defenses, it is not difficult to see the problems of massive re-supply in a non-permissive environment. Had the Russians decided to interdict the corridors or approach paths, the airlift would have undoubtedly failed.

Even though air superiority was gained over MiG Alley and the entire Korean peninsula, losses to the ground defenses continued to mount and finally accounted for the majority of US aircraft losses. Trying to exploit the offensive advantages of air superiority proved difficult because of ground defenses. Phillip Meilinger's *The Ten Propositions Regarding Airpower* states that whoever controls the air generally controls the surface. However, in this case, the US was unable to control the surface from the air sufficiently to avoid losses.

During BARREL ROLL, all losses due to enemy action were from the ground. Although aircraft losses over Laos were comparatively few compared to Vietnam, they did threaten to expose the nature of the US involvement in Laos making the losses politically sensitive as well.

The Air Force's respect for ground defenses is now manifest in some of its latest technological developments. Probably the most "visible" is stealth. The Air Force fielded two stealth bombers prior to its first stealth fighter. Also, the proliferation of stand-off weapons like cruise missiles, guided missiles, glide bombs, and rocket propelled bombs further attest to recent attempts to penetrate formidable ground defenses. The Air Force now recognizes that even low, sustained losses, have a great impact on airpower because it is difficult to quickly reconstitute. Further, since airpower is

increasingly lethal across the battlespace, each aircraft lost represents a higher penalty of lost opportunity.

There is great value to the military practitioner in presenting case studies in an operational planning format.[200] The format provides a common framework across disparate cases aiding cross-campaign study. Using a common framework aids trend recognition and analysis. Further, when areas of interest are identified, the practitioner may move quickly from case to case, extracting insight from common sections. Finally, presenting case studies in an operational planning format focuses the studies toward aspects of military campaigns most important to the practitioner. As J.F.C. Fuller said in 1926, "We require not merely a chronology of past events, but means of analyzing their tendencies—means of dissecting the corpse of war, so that we may understand its mysterious machinery."[201]

[200] One alternate approach is thematic—examination of a narrow segment of airpower over different campaigns. Examples of a thematic approach are: Eduard M. Mark, *Aerial Interdiction: Airpower and the Land Battle in Three American Wars,* (Washington DC: Center for Air Force History, 1994), William Momyer *Airpower in Three Wars,* (Maxwell AFB, Al.: Air University Press, 2003), and David R. Mets *Land Based Air Power in Third World Crisis,* (Maxwell AFB, Al.: Air University Press, 1986).
[201] J.F.C. Fuller, *The Foundations of the Science of War,* (London: Hutchinson & C. LTD., 1926), 20.

Glossary

AAA	Anti-Aircraft Artillery
ABCCC	Airborne Battlefield Command and Control Center
AIRA	Air Attaché
AWPD	Air War Planning Division
BEALCOM	Berlin Airlift Committee
BG	Bomb Group
CALTF	Combined Airlift Task Force
COMMACV	Commander, United States Military Assistance Command, Vietnam
CIA	Central Intelligence Agency
CINC	Commander in Chief
CINCPAC	Commander in Chief, Pacific Command
EUCOM	European Command
FAC	Forward Air Controller
FEAF	Far East Air Force
G	Force of Gravity
GCA	Ground Controlled Approach
GCI	Ground Controlled Intercept
GHQ	General Headquarters
HALPRO	Halverson Project
IL	Ilyushin
IP	Initial Point
MAAG	Military Assistance Group
MATS	Military Air Transport System
MiG	Mikoyan Gurevich
MOOTW	Military Operations Other Than War
NATO	North Atlantic Treaty Organization
NKAF	North Korean Air Force
NKPA	North Korean People's Army
NM	Nautical Mile
NVA	North Vietnamese Army
QRF	Quick Reaction Force
REMCO	Rear Echelon Maintenance Combined Operations
RLAF	Royal Laotian Air Force
RLG	Royal Laotian Government
ROE	Rules Of Engagement
SEATO	Southeast Asian Treaty Organization
SGU	Special Guerilla Unit

SLAR	Side Looking Radar
SOF	Special Operations Forces
UN	United Nations
US	United States
USA	United States Army
USAAF	United States Army Air Force
USAF	United States Air Force
USAFE	United States Air Forces Europe
USSR	Union of Soviet Socialist Republics
WWII	World War Two
Yak	Yakolev

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